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1986 Budget

Explanatory Notes

Agricultural Research Service

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AGRICULTURAL RESEARCH SERVICE

Purpose Statement

Agricultural Research Service was established on November 2, 1953, pursuant to authority vested in the Secretary of Agriculture by 5 U.S.C. 301 and Reorganization Plan No. 2 of 1953, and other authorities.

The research performed by Agricultural Research Service (ARS) is authorized by the Department of Agriculture Organic Act of 1862 (5 U.S.C. 511), the Research and Marketing Act of 1946, as amended (7 U.S.C. 427,1621) and the Agriculture and Food Act of 1981 (7 U.S.C. 1281).

Agricultural Research Service is responsible for conducting basic, applied and developmental research on:

- Soil and Water Conservation
- Plant Productivity
- Animal Productivity
- Commodity Conversion and Delivery
- Human Nutrition
- Integration of Agricultural Systems

The research applies to a wide range of goals; commodities; natural resources; fields of science; and geographic, climatic, and environmental conditions.

As the U.S. Department of Agriculture's in-house agricultural research agency, ARS has major responsibilities for conducting and leading the national agricultural research effort. ARS provides initiative and leadership in five areas:

- * Research on broad regional and national problems.
- * Research to support Federal action and regulatory agencies.
- * Expertise to meet national emergencies.
- * Research support for international programs.
- * Scientific resource to the Executive Branch and Congress.

The mission of ARS research is to develop new knowledge and technology which will insure an abundance of high quality agricultural commodities and products at reasonable prices to meet the increasing needs of an expanding economy and to provide for the continued improvement in the standard of living of all Americans. This mission focuses on the development of technical information and technical products which bear directly on the needs to (1) manage and use the Nation's soil, water, air, and climatic resources, and improve the Nation's environment; (2) provide an adequate supply of agricultural products by practices that will maintain a permanent and effective agriculture; (3) improve the nutrition and well-being of the American people; (4) improve living in rural America; and (5) strengthen the Nation's balance of payments.

Research is conducted at numerous field locations in the States, District of Columbia, Puerto Rico, the Virgin Islands, and in several foreign countries. Much of the work is conducted in direct cooperation with the State agricultural experiment stations, other State and Federal agencies, and private organizations.

Central offices of ARS are in the Washington, D.C. Metropolitan Area. The field activities are managed on a national basis through 11 Area Offices. Activities are carried out at 140 separate field locations. As of September 30, 1984, there were 7,426 full-time employees and 995 other than full-time employees. Of the total, 489 full-time employees and 52 other than full-time employees worked in the headquarters office.

AGRICULTURAL RESEARCH SERVICE

Available Funds and Staff-YearsActual 1984, and Estimated 1985 and 1986

| Item | 1984 Actual Amount | Staff- Years | 1985 Estimated Amount | Staff- Years | 1986 Estimated Amount | Staff- Years |
|------------------------|-----------------------|-----------------|--------------------------|-----------------|--------------------------|-----------------|
| Direct Appropriation: | | | | | | |
| Agricultural | | | | | | |
| Research Service... | \$470,406,400 | 8,150 | \$487,022,000 | 8,242 | \$485,286,000 | 8,142 |
| Buildings and | | | | | | |
| Facilities..... | 77,925,000 | - - | 23,050,000 | - - | - - | - - |
| Total, Direct | | | | | | |
| Appropriation.... | 548,331,400 | 8,150 | 510,072,000 | 8,242 | 485,286,000 | 8,142 |
| Deduct Allotments to | | | | | | |
| Other Agencies: | | | | | | |
| Forest Service..... | -384,000 | - - | -386,000 | - - | -386,000 | |
| Net..... | 547,947,400 | 8,150 | 509,686,000 | 8,242 | 484,900,000 | 8,142 |
| Obligations from other | | | | | | |
| USDA Appropriations: | | | | | | |
| Agricultural | | | | | | |
| Marketing Service.. | 256,104 | - - | 300,000 | - - | 300,000 | - - |
| Animal and Plant | | | | | | |
| Health Inspection | | | | | | |
| Service..... | 5,990,905 | 60 | 6,400,000 | 60 | 6,400,000 | 60 |
| Federal Grain | | | | | | |
| Inspection Service.. | 205,035 | 1 | 250,000 | 1 | 250,000 | 1 |
| National Agricultural | | | | | | |
| Library..... | 162,603 | - - | 175,000 | - - | 175,000 | - - |
| Forest Service..... | 123,976 | - - | 170,000 | - - | 170,000 | - - |
| Food Safety and | | | | | | |
| Inspection Service.. | 1,437,396 | 1 | 1,500,000 | 1 | 1,500,000 | 1 |
| Office of Interna- | | | | | | |
| tional Cooperation | | | | | | |
| and Development.... | 583,577 | 5 | 750,000 | 5 | 750,000 | 5 |
| Soil Conservation | | | | | | |
| Service..... | 656,521 | 9 | 700,000 | 9 | 700,000 | 9 |
| Cooperative State | | | | | | |
| Research Service.... | 618,501 | - - | 750,000 | - - | 750,000 | - - |
| Miscellaneous | | | | | | |
| Reimbursements..... | 498,205 | - - | 1,155,000 | - - | 555,000 | - - |
| Total, Other USDA | | | | | | |
| Funds..... | 10,532,823 | 76 | 12,150,000 | 76 | 11,550,000 | 76 |
| Total, Agriculture | | | | | | |
| Appropriations.... | 558,480,223 | 8,226 | 521,836,000 | 8,318 | 496,450,000 | 8,218 |

Available Funds and Staff-YearsActual 1984, and Estimated 1985 and 1986

| Item | 1984 Actual | | 1985 Estimated | | 1986 Estimated | |
|--|--------------|-------------|----------------|-------------|----------------|-------------|
| | Amount | Staff-Years | Amount | Staff-Years | Amount | Staff-Years |
| Other Federal Funds: | | | | | | |
| Department of Defense... | \$ 425,093: | 4: | \$ 800,000: | 4: | \$ 800,000: | 4 |
| Department of Energy... | 904,754: | 3: | 1,600,000: | 3: | 1,600,000: | 3 |
| Department of Health and Human Services... | 1,747,429: | 7: | 1,800,000: | 7: | 1,800,000: | 7 |
| Department of Interior... | 205,903: | 1: | 300,000: | 1: | 300,000: | 1 |
| Department of Commerce... | 375,000: | - -: | 400,000: | - -: | 400,000: | - - |
| Environmental Protection Agency.... | 694,661: | 2: | 800,000: | 2: | 800,000: | 2 |
| Miscellaneous Reimbursement..... | 117,970: | - -: | 600,000: | - -: | 200,000: | - - |
| Total, Other Federal Funds..... | 4,470,810: | 17: | 6,300,000: | 17: | 5,900,000: | 17 |
| Non-Federal Funds: | | | | | | |
| State of California.... | 136,126: | 1: | 135,000: | 1: | 135,000: | 1 |
| State of Maryland..... | 40,839: | - -: | 40,000: | - -: | 40,000: | - - |
| Binational Agriculture Research & Development Agreement (BARD) | 1,048,204: | 9: | 1,100,000: | 9: | 1,100,000: | 9 |
| Quarters and Subsistence..... | 183,522: | - -: | 225,000: | - -: | 225,000: | - - |
| Miscellaneous Reimbursement..... | 794,779: | 1: | 800,000: | 1: | 800,000: | 1 |
| Miscellaneous Contributed Funds.... | 1,346,630: | 4: | 1,250,000: | 4: | 1,250,000: | 4 |
| Total, Non-Federal Funds..... | 3,550,100: | 15: | 3,550,000: | 15: | 3,550,000: | 15 |
| Total, Agricultural Research Service... | 566,501,133: | 8,258: | 531,686,000: | 8,350: | 505,900,000: | 8,250 |

Full-Time Equivalent

Staff-Years:

| | <u>1984 Actual</u> | <u>1985 Estimated</u> | <u>1986 Estimated</u> |
|------------------|--------------------|-----------------------|-----------------------|
| Ceiling..... | 8,108 | 8,200 | 8,100 |
| Non-Ceiling..... | <u>150</u> | <u>150</u> | <u>150</u> |
| Total..... | <u>8,258</u> | <u>8,350</u> | <u>8,250</u> |

AGRICULTURAL RESEARCH SERVICE

Permanent Positions by Staff-Year Summary

1984 Actual, 1985 Estimate and 1986 Estimate

| Grade | 1984 Actual | | | 1985 Estimate | | | 1986 Estimate | | |
|---------------------|--------------|-------|-------|---------------|-------|-------|---------------|-------|-------|
| | Headquarters | Field | Total | Headquarters | Field | Total | Headquarters | Field | Total |
| ES-6 | 1 | -- | 1 | 1 | -- | 1 | 1 | -- | 1 |
| ES-5 | 2 | 3 | 5 | 2 | 3 | 5 | 2 | 3 | 5 |
| ES-4 | -- | 18 | 18 | 1 | 18 | 19 | 1 | 18 | 19 |
| ES-3 | 2 | 1 | 3 | 1 | 10 | 11 | 1 | 10 | 11 |
| ES-2 | -- | 3 | 3 | 1 | 3 | 4 | 1 | 3 | 4 |
| ES-1 | 1 | 2 | 3 | -- | 1 | 1 | -- | 1 | 1 |
| GS-17 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| GS-16 | 7 | 1 | 8 | 7 | 1 | 8 | 7 | 1 | 8 |
| GS/GM-15 | 35 | 304 | 339 | 35 | 309 | 344 | 35 | 304 | 339 |
| GS/GM-14 | 28 | 594 | 622 | 29 | 600 | 629 | 29 | 590 | 619 |
| GS/GM-13 | 92 | 819 | 911 | 93 | 834 | 927 | 93 | 822 | 915 |
| GS-12 | 79 | 761 | 840 | 81 | 775 | 856 | 81 | 760 | 841 |
| GS-11 | 25 | 514 | 539 | 26 | 518 | 544 | 26 | 514 | 540 |
| GS-10 | -- | 16 | 16 | -- | 16 | 16 | -- | 16 | 16 |
| GS-9 | 20 | 731 | 751 | 21 | 737 | 758 | 21 | 727 | 748 |
| GS-8 | 5 | 229 | 234 | 5 | 230 | 235 | 5 | 226 | 231 |
| GS-7 | 35 | 655 | 690 | 36 | 661 | 697 | 36 | 655 | 691 |
| GS-6 | 75 | 388 | 463 | 76 | 390 | 466 | 76 | 384 | 460 |
| GS-5 | 61 | 787 | 848 | 62 | 798 | 860 | 62 | 793 | 855 |
| GS-4 | 34 | 438 | 472 | 35 | 444 | 479 | 35 | 440 | 475 |
| GS-3 | 20 | 158 | 178 | 21 | 165 | 186 | 21 | 160 | 181 |
| GS-2 | 5 | 26 | 31 | 6 | 27 | 33 | 6 | 24 | 30 |
| GS-1 | -- | 1 | 1 | -- | 1 | 1 | -- | 1 | 1 |
| Positions at rates: | | | | | | | | | |
| Established by: | | | | | | | | | |
| Act June 20, 1958: | | | | | | | | | |
| (U.S.C. 3104)..... | -- | 15 | 15 | -- | 17 | 17 | -- | 17 | 17 |

1984 Actual, 1985 Estimate and 1986 Estimate

| Grade | 1984 Actual | | 1985 Estimate | | 1986 Estimate | |
|--------------------------------|--------------|-------|---------------|-------|---------------|-------|
| | Headquarters | Field | Headquarters | Field | Headquarters | Field |
| Grade Established | | | | | | |
| under Foreign | | | | | | |
| National Pay Plan: | -- | 26 | -- | 26 | -- | 26 |
| Ungraded Positions: | -- | 933 | -- | 915 | -- | 904 |
| Total Permanent Positions..... | 527 | 7,423 | 539 | 7,499 | 539 | 7,399 |
| Staff-Years: | | | | | | |
| Ceiling..... | 481 | 7,627 | 492 | 7,708 | 492 | 7,608 |
| Non-Ceiling..... | 10 | 140 | 10 | 140 | 10 | 140 |
| TOTAL..... | 491 | 7,767 | 502 | 7,848 | 502 | 7,748 |

AGRICULTURAL RESEARCH SERVICE

CLASSIFICATION BY OBJECTS1984 and Estimated 1985 and 1986

| | <u>1984 Actual</u> | <u>1985 Estimated</u> | <u>1986 Estimated</u> |
|---|---------------------------|---------------------------|---------------------------|
| Personnel Compensation: | | | |
| Headquarters..... | \$ 13,802,644 | \$ 14,755,000 | \$ 14,147,000 |
| Field..... | <u>217,126,718</u> | <u>229,357,000</u> | <u>224,467,000</u> |
| 11 Total Personnel Compensation..... | 230,929,362 | 244,112,000 | 238,614,000 |
| 12.0 Personnel Benefits..... | 28,204,263 | 29,897,000 | 29,191,000 |
| 13.0 Benefits for Former Personnel. | 576,963 | - - | - - |
| Total Pers. Comp. & Benefits..... | <u>259,710,588</u> | <u>274,009,000</u> | <u>267,805,000</u> |
| Other Objects: | | | |
| 21.0 Travel and transportation of persons..... | 5,968,949 | 5,247,000 | 4,881,000 |
| 22.0 Transportation of things..... | 1,164,906 | 1,200,000 | 1,250,000 |
| 23.2 Communications, utilities and other rents..... | 29,540,780 | 30,595,000 | 31,411,000 |
| 24.0 Printing and reproduction..... | 1,001,125 | 1,010,000 | 1,010,000 |
| 25.0 Other services..... | 90,615,822 | 93,574,000 | 95,188,000 |
| 26.0 Supplies and materials..... | 41,308,844 | 42,161,000 | 43,118,000 |
| 31.0 Equipment..... | 29,377,809 | 30,426,000 | 31,120,000 |
| 32.0 Lands and structures..... | 17,797,927 | 24,903,000 | 73,644,000 |
| 41.0 Grants, subsidies, and contributions..... | <u>1,759,458</u> | <u>1,759,000</u> | <u>1,759,000</u> |
| Total other objects..... | <u>218,535,620</u> | <u>230,875,000</u> | <u>283,381,000</u> |
| Total obligations..... | <u><u>478,246,208</u></u> | <u><u>504,884,000</u></u> | <u><u>551,186,000</u></u> |
| Position Data: | | | |
| Average Salary, ES positions..... | \$65,569 | \$67,274 | \$65,827 |
| Average Salary, GS positions..... | \$29,339 | \$30,548 | \$29,601 |
| Average Grade, GS positions..... | 9.34 | 9.34 | 9.34 |
| Average Salary of Ungraded positions..... | \$21,048 | \$21,916 | \$21,236 |

NOTE: Includes Regular and Buildings and Facilities Appropriations.

AGRICULTURAL RESEARCH SERVICE

The estimates include proposed changes in the Language of this item as follows: (new language underscored; deleted matter enclosed in brackets).

Agricultural Research Service

- For necessary expenses to enable the Agricultural Research Service to perform agricultural research and demonstration relating to production, utilization, marketing, and distribution (not otherwise provided for), home economics or nutrition and consumer use, and to coordinate and provide program leadership for higher education work of the Department, and for acquisition of lands by donation, exchange, or purchase at a nominal cost not to exceed \$100; [\$489,022,000] \$483,286,000: Provided, That appropriations hereunder shall be available for field employment pursuant to the second sentence of section 706(a) of the Organic Act of 1944 (7 U.S.C. 2225), and not to exceed \$115,000 shall be available for employment under 5 U.S.C. 3109: Provided further, That funds appropriated herein can be used to provide financial assistance to the organizers of
- 1 national and international conferences, if such conferences are in support of agency programs: Provided further, That appropriations hereunder shall be available for the operation and maintenance of aircraft and the purchase of not to exceed one for replacement only: Provided further, That uniform allowances for each uniformed employee of the Agricultural Research Service shall not be in excess of \$400 annually: Provided further, That of the appropriations hereunder not less than \$10,526,600 shall be available to conduct marketing research: Provided further, That appropriations hereunder, shall be available pursuant to 7 U.S.C. 2250 for the construction, alteration, and repair of buildings and improvements, but
 - 2 unless otherwise provided the cost of constructing any one building shall not exceed [\$125,000] \$154,000, except for headhouses connecting greenhouses which shall each be limited to \$500,000, and except for ten buildings to be constructed or improved at a cost not to exceed [\$250,000] \$295,000 each, and the cost of altering any one building during the fiscal year shall not exceed 10 per centum of the current replacement value of the building or [\$125,000] \$154,000, whichever is greater: Provided further, That the limitations on alterations contained in this Act shall not apply
 - 3 to a total of [\$200,000] \$295,000, for facilities at Beltsville, Maryland: Provided further, That the foregoing limitations shall not apply to replacement of buildings needed to carry out the Act of April 24, 1948 (21 U.S.C. 113a): Provided further, That the limitation on purchase of land
 - 4 shall not apply to an option to purchase land at [Houma, Louisiana, and at
 - 5 Fresno, California,] Florence, South Carolina, for a term of not to exceed
 - 6 one year: Provided further, That the limitations on construction contained in this Act shall not apply to the establishment of National Clonal Germplasm Repository for Citrus, Riverside, California.

Special fund: To provide for additional labor, subprofessional, and junior scientific help to be employed under contracts and cooperative agreements to strengthen the work at Federal research installations in the field, \$2,000,000.

- 7 [Sec 126. Notwithstanding any other provision of this joint resolution, there is an additional amount appropriated for the Agricultural Research Service, United States Department of Agriculture, \$1,000,000.]

Explanation of Changes

The first change would make explicit the agency's authority to provide financial assistance to the organizers of national conferences as well as international conferences, that are in support of agency programs. The agency places great importance for the continued use of appropriations to support national meetings when they contribute to the accomplishment of program responsibilities.

The second change would increase the cost limitation on (1) construction of any one building (except headhouses connecting greenhouses) from \$125,000 to \$154,000; (2) construction of ten buildings from \$250,000 to \$295,000 each; and (3) altering any one building during the fiscal year from \$125,000 to \$154,000.

The construction cost limitation on buildings should be increased in fiscal year 1986 to maintain the previous values of these authorizations. Increases requested are derived from conservative estimates of cost changes for construction of specialized research laboratories and associated support facilities applicable in the construction industry and in anticipation of a 10% inflation and escalation of construction costs in FY 1986 for these specialized type of facilities.

The authorized construction cost limitation on specialized research laboratories and associated support facilities in past fiscal years has not maintained parity with cost in construction prices which has increased approximately 77% since FY 1981. This compares to an authorized increase of 48% since FY 1981. As a result, the cost for the construction of these facilities are funded at approximately 84% level of requirements.

The third change would increase the cost limitation specifically for Beltsville. This is necessary to maintain the previous values of this authorization. The increase requested is derived from conservative estimates of cost changes for construction of specialized research laboratories and associated support facilities applicable in the construction industry and in anticipation of a 10% inflation and escalation of construction costs in FY 1986 for these specialized type of facilities.

The authorized construction cost limitation on specialized research laboratories and associated support facilities in past fiscal years has not maintained parity with construction prices which has increased approximately 195% since FY 1981. This compares to an authorized increase of 100% since FY 1981. As a result, the cost for construction of these facilities are funded at approximately 68% level of requirements.

The fourth change would delete language exempting purchase of land at Houma, Louisiana, and Fresno, California. This language is applicable to FY 1985 and will not be required in FY 1986.

The fifth change would provide exemption to requirements on acquisition of land at a cost greater than \$100. The request would provide authority to acquire by purchase of 58.2 acres of land adjacent to the ARS Coastal Plains Soil and Water Conservation Research Center, Florence, South Carolina. Such property is to be disposed of by Clemson University, and the continual use of this land by ARS is critical to the effectiveness of the research program.

The sixth change would provide exemption to construction limitations for the establishment of a National Clonal Germplasm Repository for Citrus, Riverside, California.

The seventh change would delete language added by P.L. 98-473, making continuing appropriations for the fiscal year 1985, for emergency research on citrus canker.

AGRICULTURAL RESEARCH SERVICE

| | |
|--------------------------------|-------------------|
| Appropriation Act, 1985..... | \$494,822,000 |
| Budget Estimate, 1986..... | 485,286,000 |
| Decrease in Appropriation..... | <u>-9,536,000</u> |

Adjustments in 1985:

| | |
|--|--------------------------------|
| Appropriation Act, 1985..... | \$494,822,000 |
| Activities Transferred to Cooperative State Research Service..... | <u>-7,800,000^{a/}</u> |
| Adjusted Base for 1985..... | 487,022,000 |
| Budget Estimate, 1986..... | 485,286,000 |
| Decrease from Adjusted 1985..... | <u>-1,736,000</u> |

^{a/} Transfer of \$3,000,000 for higher education graduate fellowships; \$2,000,000 for strengthening grants at 1890 Colleges and Universities, Tuskegee Institute and the University of the District of Columbia; and \$2,800,000 Morrill-Nelson (permanent appropriation) to the Cooperative State Research Service.

SUMMARY OF INCREASES AND DECREASES
(On basis of adjusted appropriation)

| <u>Projects</u> | <u>1985 Estimated</u> | <u>Management Savings</u> | <u>Program Changes</u> | <u>1986 Estimates</u> |
|--|---------------------------------|--------------------------------|----------------------------|---------------------------|
| 1. Research on soil and water conservation... | \$59,503,000 | -\$ 907,000 | +\$1,000,000 | \$59,596,000 |
| 2. Research on plant productivity..... | 188,080,000 | -2,865,000 | +3,354,000 | 188,569,000 |
| 3. Research on animal productivity..... | 88,934,000 | -1,355,000 | +646,000 | 88,225,000 |
| 4. Research on commodity conversion and delivery | 91,154,000 | -1,389,000 | +500,000 | 90,265,000 |
| 5. Human nutrition research | 36,813,000 | -561,000 | -- | 36,252,000 |
| 6. Integration of agricultural systems..... | 10,446,000 | -159,000 | -- | 10,287,000 |
| 7. Repair and maintenance of facilities..... | 11,092,000 | -- | -- | 11,092,000 |
| 8. Contingencies..... | <u>1,000,000</u> | <u>--</u> | <u>--</u> | <u>1,000,000</u> |
| Total Available..... | <u>487,022,000^{a/}</u> | <u>-7,236,000^{b/}</u> | <u>+5,500,000</u> | <u>485,286,000</u> |

^{a/} Of this amount \$1,313,000 is being proposed for rescission due to Section 2901, Deficit Reduction Act savings.

^{b/} Consists of proposed decrease of \$2,596,000 for management savings, an increase of \$10,827,000 for annualized and absorbed pay increases effective in FY 1985, and a decrease of \$15,467,000 for a 5% pay reduction in FY 1986.

SUMMARY OF INCREASES AND DECREASES
(On basis of specific projects)

| <u>Item of Change</u> | <u>1985 Estimated</u> | <u>Management Savings</u> | <u>Program Changes</u> | <u>1986 Estimates</u> |
|--|---------------------------|-------------------------------|----------------------------|---------------------------|
| Groundwater quality management..... | \$2,000,000 | - - | +\$500,000 | \$2,500,000 |
| Improved technologies for SCS resource inventories. | 2,500,000 | - - | +500,000 | 3,000,000 |
| Staffing and operating clonal germplasm repositories..... | 1,000,000 | - - | +1,000,000 | 2,000,000 |
| Germplasm evaluation and enhancement for major crops..... | 2,600,000 | - - | +1,200,000 | 3,800,000 |
| Caribbean Basin initiative. | - - | - - | +154,000 | 154,000 |
| Develop gene transfer systems for crop improvement..... | 4,200,000 | - - | +1,000,000 | 5,200,000 |
| Animal health research in support of action agencies..... | 1,500,000 | - - | +753,000 | 2,253,000 |
| Transfer of Cooperative Farm Building Plan Exchange to Extension Service..... | 107,000 | - - | -107,000 | - - |
| Develop alternative technology to fumigants for quarantine treatments of exported commodities..... | 2,200,000 | - - | +500,000 | 2,700,000 |
| All Other..... | <u>470,915,000</u> | <u>-\$7,236,000b/</u> | <u>- -</u> | <u>463,679,000</u> |
| Total Available..... | <u>487,022,000a/</u> | <u>-7,236,000</u> | <u>+5,500,000</u> | <u>485,286,000</u> |

a/ Of this amount \$1,313,000 is being proposed for rescission due to Section 2901, Deficit Reduction Act savings.

b/ Consists of proposed decrease of \$2,596,000 for management savings, an increase of \$10,827,000 for annualized and absorbed pay increases effective in FY 1985, and a decrease of \$15,467,000 for a 5% pay reduction in FY 1986.

Project Statement
(on the basis of adjusted appropriation)

| Project | 1984 Actual | 1985 Estimated | Increase or Decrease | 1986 Estimated |
|--|--------------------------------|--------------------------------|-------------------------|--------------------------------|
| | Amount : Staff: : Years: | Amount : Staff: : Years: | | Amount : Staff: : Years: |
| 1. Research on soil and water conservation.... | \$57,367,869: 993: | \$59,503,000: 1,003: | +\$93,000(1): | \$59,596,000: 991: |
| 2. Research on plant productivity.... | 181,671,839: 3,435: | 188,080,000: 3,463: | +489,000(2): | 188,569,000: 3,421: |
| 3. Research on animal productivity.... | 85,591,012: 1,623: | 88,934,000: 1,643: | -709,000(3): | 88,225,000: 1,623: |
| 4. Research on commodity conversion and delivery.. | 87,508,389: 1,693: | 91,154,000: 1,718: | -889,000(4): | 90,265,000: 1,697: |
| 5. Human nutrition re- search..... | 34,117,672: 235: | 36,813,000: 232: | -561,000(5): | 36,252,000: 229: |
| 6. Integration of agricultural systems..... | 9,501,644: 171: | 10,446,000: 183: | -159,000(6): | 10,287,000: 181: |
| 7. Repair and maintenance of facilities..... | 11,092,000: - -: | 11,092,000: - -: | - -: | 11,092,000: - -: |
| 8. Contingencies: <u>a/</u> | - -: | 1,000,000: - -: | - -: | 1,000,000: - -: |
| Unobligated balance..... | 3,555,975: - -: | - -: | - -: | - -: |
| Total available or estimate... | 470,406,400: 8,150: | 487,022,000: 8,242: | -1,736,000 | 485,286,000: 8,142: |
| Transfer to CSRS..... | 7,800,000: - -: | 7,800,000: - -: | | |
| Total, Appropriation..... | 478,206,400: 8,150: | 494,822,000: 8,242: | | |

a/ Obligations for the \$1,000,000 appropriated in 1984 are reflected in the above programs.

b/ A request has been submitted to Congress to rescind \$1,313,000.

c/ Transfer of \$3,000,000 for higher education graduate fellowships, \$2,000,000 for strengthening grants at 1890 Colleges and Universities, Tuskegee Institute and the University of the District of Columbia, and \$2,800,000 Morrill-Nelson (permanent appropriation) to the Cooperative State Research Service.

Explanation of Program

Under the Agriculture, Rural Development and Related Agencies Appropriation Act of 1985, Agricultural Research Service develops the means for:

1. Managing and conserving the Nation's soil and water resources for a stable and productive agriculture. -- Research is conducted to develop the technology for assessing and predicting long-term changes in the quantity and quality of soil, water, and air resources available to agriculture; to provide the technology needed for improving, protecting, and restoring the productive capacity of agricultural soils; to develop improved water-management systems and practices to achieve effective and efficient use of water resources; and to develop subsystems and models that integrate the use of soil, water, and air resources for optimum management of major land resource areas.
2. Maintaining and increasing the productivity and quality of crop plants. -- Research is conducted to broaden the germplasm resources of plants and beneficial organisms to ensure maximum genetic diversity for improved productivity; to select and modify germplasm of plants, beneficial organisms, and pests; to develop improved production practices for maintaining and increasing crop productivity and quality and for reducing costs; to discover principles and develop improved methods for reducing crop losses caused by weeds, diseases, insects, nematodes, and other pests; and to develop improved methods for integrating the crop- and pest-management practices needed for higher and more stable levels of crop production.
3. Increasing the productivity of animals and the quality of animal products. -- Research is conducted to increase the genetic capacity of animals for production; to improve the efficiency of reproduction and reproduction-related biological processes; to improve animal nutrition and feed efficiency to increase productivity and product quality; to develop ways to prevent or control losses from diseases, parasites, and toxicants and other substances that limit animal performance and reduce the quality of animal products; to develop means for controlling insects, ticks, and mites that affect animals and man; and to devise means for improving and integrating procedures and facilities for production and transport of animals to increase productivity, reduce costs, and minimize stresses.
4. Achieving maximum use of agricultural products for domestic markets and export. -- Research is conducted to develop means for enhancing the inherent properties and uses of agricultural materials; to develop the means for meeting foreign and domestic user and regulatory requirements relating to toxic factors in food, feed, and other agricultural products; to develop means for reducing or eliminating postharvest losses caused by pests, spoilage, and physical and environmental damage; and to develop the means for increasing efficiency of systems for processing, handling, storing, and distributing agricultural products.
5. Promoting optimum human health and well-being through improved nutrition and family resource management. -- Research is conducted to define the nutrient requirements of humans at all stages of the life cycle; to determine the nutrient content of agricultural commodities and processed foods as eaten, and establish the bioavailability of their nutrients; and to improve the nutritional status of humans and the well-being of families by making techniques available for assessing the effectiveness of nutrition and home economics programs.

6. Integrating scientific knowledge of agricultural production, processing, and marketing into systems that optimize resource management and facilitate transfer of technology to users. -- Research is conducted to develop integrated systems for efficiently producing, processing, and marketing agricultural products; and to develop alternative agricultural systems, including those of small scale, that are less dependent upon nonrenewable resources and that are productive, efficient, and sustainable in the long term.

The research performed by Agricultural Research Service (ARS) is authorized by the Department of Agriculture Organic Act of 1862 (5 U.S.C. 511), the Research and Marketing Act of 1946, as amended (7 U.S.C. 427, 1621) and the Agriculture and Food Act of 1981, (7 U.S.C. 1281).

JUSTIFICATION OF INCREASES AND DECREASES

- (1) An increase of \$93,000 for research on soil and water conservation consisting of:
- (a) A net decrease of \$907,000 for management savings including an increase of \$1,357,000 for annualization of FY 1985 pay cost and decreases of \$326,000 for management savings and \$1,938,000 for a 5 percent pay reduction in FY 1986.
 - (b) An increase of \$500,000 for groundwater quality management (\$2,000,000 available in FY 1985).

Need for Change. The quality of the Nation's groundwater is being degraded as greater use is made of groundwater supplies and as more chemicals are used by various industries, including agriculture. The recent increase in detection of pesticides in groundwater coupled with deterioration in the quality of major water bodies such as the Chesapeake Bay highlight these concerns. Agriculture has a tremendous stake in maintaining good quality groundwater supplies for future use by agriculture and in preventing groundwater contamination. Chemicals are essential in maintaining the productivity of U.S. agriculture. There is broad agreement in the public and private sectors that improved chemical management technology will be needed as chemical and groundwater use increase. ARS has major responsibility for this research because groundwater contamination by agricultural chemicals impacts many major cropland areas. ARS has the capability of conducting the long-range multidisciplinary research needed to develop optimum water quality control strategies. Coordinated regional and national planning and a stable research environment are also needed to meet the urgent needs of action agencies in a timely manner.

Nature of Change. A successful strategy for identifying and controlling major sources of groundwater contamination by agricultural chemicals will require accelerated and expanded research in three major areas. (1) An expanded research program among existing laboratories addressing groundwater quality problems is needed to develop new and improved concepts of chemical transport and to improve our scientific understanding of the key physical, chemical and biological processes that determine the form, fate, and patterns of behavior of organic and inorganic substances as they move through the root, vadose and groundwater zones. (2) To exploit this new knowledge, and to evaluate its significance and relevance in quantitative terms, will require an accelerated program on knowledge integration in the form of process oriented models. With these analytical tools, planning and action agencies will have the capability to predict the impact of changes in chemical application technology, soil and water management, and cropping systems on groundwater quality. (3) Finally, an expanded effort is needed to evaluate under field conditions the degree to which improvements in chemical application technology, changes in water management and tillage practices, and new pesticide formulations can minimize the possibility of groundwater contamination. Results of this research will assist in identifying the most vulnerable aquifers, lead to increased efficiencies in fertilizer and pesticide use, and reduce the risks, both to major environmental and ecological damage and to the future economic vitality of U.S. agriculture. This research is needed to build user and community confidence in groundwater quality management and control strategies. It will also provide the chemical

industry with vital scientific information for its product development programs. Beneficiaries include all local, State and Federal agencies with environmental programs and responsibilities, the entire farming community whose survival depends on the continued availability of agricultural chemicals, and those segments of the general community who could be adversely affected by groundwater contamination.

- (c) An increase of \$500,000 for improved technologies for SCS resource inventories (\$2,500,000 available in FY 1985).

Need for Change. The Soil Conservation Service (SCS) has requested that ARS help develop improved and less costly methods for inventorying and evaluating the status of the nation's soil and water resources. The Resource Conservation Act (RCA) requires a National Resources Inventory (NRI) every 5 years and SCS and other agencies have a continuing need for information for designing and implementing operational programs using existing technology. Inventories such as the NRI require the commitment of many hundreds of person-years at an estimated value of tens of millions of dollars.

The objective of this initiative is to develop faster, cheaper, and more accurate methods for assessing the status of soil and water resources. Carrying out the NRI is the responsibility of SCS, and conducting research for SCS is an ARS responsibility. Industry has no research of this nature. A few States have some research efforts, but limited to the individual States. The RCA requires a national inventory and assessment. The proposed research would be a logical extension or expansion of ongoing programs in ARS, but with a heavier involvement of SCS than in the past.

Nature of Change. The requested increase would be used to implement a joint project with the SCS on developing improved technologies for acquiring soil, water, and climatic data; summarizing the data; and interpreting the results. The main approach will be to explore the uses of remote sensing technologies for data collection and sampling, including data from LANDSAT, NOAA weather satellites, and aircraft. From past work with low-level sensors, we have a good understanding of sensor responses to critical variables such as sediments, soil moisture, snow, land use, vegetation, and other indicators of soil and water status on crop and range lands. The task now is to extend this knowledge over large areas for change detection over years. High-speed computer processing and handling of data will be a significant part of this joint project for reducing costs and manpower requirements and making better use of other available data on soils, climate, range condition, and other variables. The work will be concentrated at existing major ARS remote sensing laboratories. Funds will be used to acquire or purchase data, upgrade computer facilities, and recruit scientific and support staff. The ultimate products will be change detection models and a geo-referenced information system for use by all the land management agencies.

(2) An increase of \$489,000 for research on plant productivity consisting of:

- (a) A net decrease of \$2,865,000 for management savings including an increase of \$4,287,000 for annualization of FY 1985 pay cost and decrease of \$1,028,000 for management savings and \$6,124,000 for a 5 percent pay reduction in FY 1986.
- (b) An increase of \$1,000,000 for staffing and operating clonal germplasm repositories (\$1,000,000 available in FY 1985).

Need for Change. The national system of clonal repositories for fruit and nut crops has been jointly conceptualized by the Agricultural Research Service and the Cooperative State Research Service (CSRS). CSRS funding support has been provided through the Special Research Grants program which has been recommended for termination. It is imperative that staffing and other operating costs previously provided through CSRS continue, otherwise, the system which is only 75 percent operational will have to be further reduced. The total \$2,000,000 appropriation is needed to complete and operate the system.

It is anticipated that by placing total responsibility for the program in one agency that increased efficiency can be achieved in managerial activities such as planning, budgeting, and reporting as well as in planning and implementing research. The advisory committees to the national repository system would remain in place and continue to provide review and guidance for the entire program.

Nature of Change: Continued funding will permit the completion of the national system of clonal germplasm repositories for fruit and nut crops and provide for their staffing and operational needs. Research at these repositories will involve the acquisition of new germplasm, improved technologies, including cryopreservation, for safer and less costly preservation of clonal germplasm, and the evaluation and enhancement of germplasm to improve its usefulness to plant breeders for developing new, more efficient commercial varieties.

- (c) An increase of \$1,200,000 for germplasm evaluation and enhancement for major crops (\$2,600,000 available in FY 1985).

Need for Change. Plant germplasm is an essential natural resource and current funding is inadequate to properly support its acquisition, maintenance, evaluation, and enhancement. The current ARS budget for the entire National Plant Germplasm System (NPGS) is about \$15 million. Two separate studies have indicated a total funding need for the NPGS of more than \$40 million by the early 1990's.

The highest priority short-term need of the germplasm program is to evaluate the more than 500,000 unique genetic lines already on hand in the NPGS collections for those traits judged to be most important for each species by scientists (State, Federal, and private) on Crop Advisory Committees (CAC's). A longer term objective is to exploit the identified traits by incorporating them, using both traditional plant breeding methods as well as new biotechnology tools, into enhanced germplasm lines for use by plant breeders.

Nature of Change. Funds will be used to support scientists and technicians, both inhouse and extramurally, to accelerate germplasm research by systematically growing out seed and plant collections and inventorying and evaluating traits observed. The information obtained will be catalogued into the new ARS-operated computerized national germplasm system called GRIN, Germplasm Resource Information Network, which is accessible to all public and private plant breeders. Seed or other plant material having promising traits will be made available on request to plant breeders for use in developing crop varieties with improved quality and production efficiencies. Research emphasis will be placed on the evaluation of germplasm collections of major crop species not now receiving adequate attention, including soybean, sorghum, alfalfa, sunflower, edible legumes, and citrus. Based on results obtained from this new research and other ongoing research, new fund support will also be provided to programs to study the ecological and geographic distribution of genetic diversity of some crop species in their center of origin so that gaps in germplasm collected can be filled.

- (d) An increase of \$154,000 for the Caribbean Basin initiative (\$0 available in FY 1985).

Need for Change. Puerto Rico requires a modern agriculture to utilize fully its natural resources of soil, water, and year-round warm weather; to produce most of the food it now imports; to improve its economy; to provide employment; and to contribute to the socio-economic infrastructure of the Island.

The present state of agriculture on the Island suffers from long outdated technology and inefficient production. As a result, the consumer pays high prices for locally grown food, the taxpayer heavily subsidizes production, and the farmer derives a meager income. There have been decreasing yields of coffee, citrus, and sugar, and commercial production of vegetables is almost nonexistent.

Nature of Change. Funding will be used to assist in the training, development, and establishment of junior professional research personnel among natives of Puerto Rico and other Caribbean Basin countries while aiding ongoing research at the USDA/ARS tropical Agricultural Research Station at Mayaguez, Puerto Rico. Problems to be addressed include development of improved plant germplasm, particularly disease resistance of tomatoes, beans, potatoes, forages, and other crops of importance to Caribbean agriculture. This program in the short-term will develop improved agricultural technologies while in the long-term help increase the number and improve the capabilities of native agricultural scientists.

- (e) An increase of \$1,000,000 to develop gene transfer systems for crop improvement (\$4,200,000 available in FY 1985).

Need for Change. To remain competitive in world markets, U.S. farmers must have the technology to reduce the relative costs of producing crop commodities and to improve the quality of those commodities. New and improved high-yielding and high-quality crop varieties with resistance to disease and insect pests and tolerance to climatic stress are a very cost-effective technology for reducing production costs.

Plant breeders need improved tools and techniques to accelerate and more precisely control the transfer and regulation of these yield and quality genes. The objectives of this research are 1) to develop knowledge on how genes regulate plant growth and how plant gene expression may be controlled; 2) to develop microbial vectors for transferring desired genes and their controlling operators; and 3) to develop models for applying these new techniques to develop improved germplasm of economically important cereal, oilseed, fiber, and vegetable crops.

This is long-term, high-risk research to utilize emerging biotechnology techniques to accelerate and more precisely control crop variety improvement and to solve difficult agricultural productivity problems. ARS will provide national leadership in this research and transfer the new technology for application in ARS, State, and industry crop breeding programs.

This is a new research to strengthen and broaden the plant biotechnology program at the recently established Plant Gene Expression Center (PGEC) at Albany, California.

Nature of Change. Funds will be used to staff the Plant Gene Expression Center with a core group of outstanding scientists and to equip their laboratories with high technology instrumentation needed to carry out the research. Emphasis will be on the objectives outlined above. The anticipated results of this research are the acceleration of the development of new varieties of the major cereal grain and other food crops which will enable farmers to reduce production costs and better compete in the world markets. Beneficiaries of this research will be farmers, consumers, and crop commodity industries.

(3) A decrease of \$709,000 for research on animal productivity consisting of:

- (a) A net decrease of \$1,355,000 for management savings including an increase of \$2,028,000 for annualization of FY 1985 pay cost and decreases of \$486,000 for management savings and \$2,897,000 for a 5 percent pay reduction in FY 1986.
- (b) An increase of \$753,000 for animal health research in support of action agencies (\$1,500,000 available in FY 1985).

Need for Change. Many foreign and domestic diseases and arthropod pests threaten the productivity, efficiency, and perhaps the survival of the U.S. livestock and poultry industries. Changes in mode of international travel and movement of people and animals have increased the risk and likelihood of exotic diseases and arthropod vectors being introduced into farm and production systems in this country.

Certain domestic diseases, especially in larger herds, have obscure epidemiology which can be elucidated in laboratory controlled herds. Individuals and families of livestock exhibit different immune responses to infectious agents and their vectors. These inherited characters must be identified and related to molecular and biochemical control for eventual herd health management of infectious diseases and parasites.

As the U.S. production systems involve larger, single populations of livestock and poultry on any given farm premise, the population dynamics of diseases and arthropods have become more important in planning preventive health programs and carrying out disease surveillance in the U.S. ARS is committed to support action agency programs. Unique high containment facilities and expertise are available in ARS. The action agency (APHIS-VS) must have new tools in order to carry out their mission of animal disease and arthropod control and eradication.

Nature of Change. Research must provide new technologies and new applications of current technologies in order to identify the unwanted entry of infectious diseases and arthropod pests into the food animal production systems in this country. The dynamics of the epidemiology of spread and movement of infectious diseases and their vectors must be elucidated. The inherited ability host possesses have to respond to these infectious diseases and their vectors must be defined and related to the dynamics of resistance of individuals and their siblings and offspring. Additional resources would be used to:

- o Utilize biotechnology techniques such as nucleic acid diagnostic probes, recombinant technology and monoclonal antibody techniques to develop accurate, simple, and fast tests for diagnosing avian influenza, exotic Newcastle disease, leptospirosis, paratuberculosis and pseudorabies.
- o Determine the infectivity of bovine and swine embryos when the host or parent has been infected with certain foreign disease causing viruses, such as swine vesicular disease, African swine fever, and rinderpest.
- o Develop methods to determine the incidence of diseases, parasites, and arthropods in controlled herds will be developed. Genetic differences in the immune response of individuals and families to infectious agents will be identified and will be characterized molecularly and biochemically. The ability to measure at a subcellular level will provide markers of disease resistance that will permit more precise control and lead to the reduction of certain diseases and their arthropod vectors in livestock.
- o Apply biotechnology procedures to produce a purified antigen in order to develop methods to prevent infection of swine with trichinosis.

Results of this work will reduce the economic impact of foreign and domestic diseases and arthropods should they find entry into herds and flocks in this country. The action agencies will be better prepared to prevent, control, or eliminate the infectious agents or pests, thereby enhancing the production efficiency of the livestock and poultry industry in the U.S.

- (c) A decrease of \$107,000 for the transfer of the Cooperative Farm Building Plan Exchange Program to the Extension Service.

Need for Change. The Cooperative Farm Building Plan Exchange Program, which is of special importance to the small farmer and low and moderate income rural homeowner, is designed to improve the transfer of farm building research results into practical application. The Assistant Secretary authorized the transfer of functions for this program from the Agricultural Research Service to the Extension Service.

Nature of Change. This proposal will provide funding for the Cooperative Farm Building Plan Exchange Program and complete the transfer of functions from the Agricultural Research Service to Extension Service.

- (4) A decrease of \$889,000 for research on commodity conversion and delivery consisting of:

- (a) A net decrease of \$1,389,000 for management savings including an increase of \$2,078,000 for annualization of FY 1985 pay cost and decreases of \$498,000 for management savings and \$2,969,000 for a 5 percent pay reduction in FY 1986.
- (b) An increase of \$500,000 to develop alternative technology to fumigants for quarantine treatments of exported commodities (\$2,200,000 available in FY 1985).

Need for Change. Unless new quarantine treatments for export commodities are developed rapidly to replace fumigants under EPA cancellation actions, loss of export markets for fresh fruits and vegetables, grains and oilseeds will result. This increase is requested to speed up research to provide alternate technologies which are effective and acceptable to the regulatory authorities while maintaining product quality. The agricultural chemicals industry will not invest heavily in research for products with a relatively low volume usage or in systematic approaches which do not have proprietary product opportunities. Growers are not necessarily quarantine treaters, thus the States have a limited stake in the development of new technologies. Most of the research is underway and increase funds will be used to expand certain of these efforts in an attempt to cut the time period needed to devise new treatments.

Nature of Change. Funds will be used to expand research efforts in use of radiation, temperature manipulation, modified atmospheres, acoustical detection of feeding insects in fruits, and mechanical removal of insect infested fruits as alternate treatments. Also, a multiphased treatment system will be developed using existing technology from in-field control through storage and packing phases. Emphasis in these new research thrusts will be on the marketing and export problems with fresh fruit of citrus, papaya, and mangoes caused by the Caribbean fruit fly, the Mexican fruit fly, and the Hawaiian "tri-fly" species of fruit flies. The expected outcomes are useful alternate quarantine treatment methods. Benefit is systematic, grower to exporter.

- (5) A net decrease of \$561,000 for human nutrition research consisting of an increase of \$839,000 for annualization of FY 1985 pay cost and decreases of \$201,000 for management savings and \$1,199,000 for a 5 percent pay reduction in FY 1986.
- (6) A net decrease of \$159,000 for Integration of Agricultural Systems consisting of an increase of \$238,000 for annualization of FY 1985 pay cost and decreases of \$57,000 for management savings and \$340,000 for a 5 percent pay reduction in FY 1986.

CONTINGENCY RESEARCH FUND

The Contingency Research Fund, established by Congress in Fiscal Year 1962, is designed to provide a ready source of funds to meet unforeseen and immediate research needs. Releases from the fund are generally made in situations where an emergency exists, or for special needs such as an unexpected scientific "breakthrough," or for new diseases or pest problems where it appears inadvisable to wait for consideration of a request for funds for the project in the regular budget process. In allocating funds, the procedure is to make no commitments for allocations from the fund beyond the current year.

| | <u>1984 Obligations</u> |
|--|-------------------------|
| Repairs on damaged laboratory and vehicles and other items, and cost of added security, Rome, Italy..... | \$ 30,000 |
| Replacement of facility and equipment destroyed by a tornado, Miles City, Montana..... | 65,000 |
| Replacement of a barn destroyed by fire, Beltsville, Maryland.. | 68,000 |
| Sound/Sonar Detection Device for development of quarantine treatment methods for insects, Gainesville, Florida..... | 100,000 |
| Quarantine treatment for EDB for the Mexican Fruit Fly in grapefruit, Weslaco, Texas..... | 150,000 |
| Quarantine treatment for Dacus Latifrons (Fruit Fly), Honolulu, Hawaii..... | 80,000 |
| Eradication of emergency outbreak of Avian Influenza, and research on cause and prevention, Athens, Georgia..... | 100,000 |
| Repairs to equipment at Northeastern Watershed Research Center field weather data gathering site, Klingerstown Pennsylvania... | 15,000 |
| Emergency repairs on gas line at the Forage and Livestock Research Facility, El Reno, Oklahoma..... | 25,300 |
| Replace damaged roof on Cotton Research Laboratory, Phoenix, Arizona..... | 105,000 |
| Construction of a chemical storage building for safety, health and welfare of location personnel, Brookings, South Dakota..... | 86,000 |
| Pyrolytic incinerator for radioactive waste at the Meat Animal Research Center to meet safety requirements, Clay Center, Nebraska..... | 134,503 |
| Partial cost for installation of sprinkler system, Buildings 318 and 200, Human Nutrition Research Center, Beltsville, Maryland..... | <u>41,197</u> |
| Total 1984 Obligations, Contingency Research Fund..... | 1,000,000 ===== |

STATEMENT OF OBLIGATIONS AND STAFF-YEARS BY LOCATION

(On basis of adjusted appropriation)

| Location | Actual 1984 | | Estimated 1985 | | Estimated 1986 | |
|----------------------|-------------|-------------|----------------|-------------|----------------|-------------|
| | Dollars | Staff-Years | Dollars | Staff-Years | Dollars | Staff-Years |
| ALABAMA, Auburn..... | \$2,680,834 | 45 | \$2,420,700 | 46 | \$2,384,400 | 45 |
| ALASKA | | | | | | |
| Fairbanks..... | - - | -- | - - | -- | 734,600 | 7 |
| Palmer..... | 695,003 | 7 | 741,400 | 7 | - - | -- |
| Total.... | 695,003 | 7 | 741,400 | 7 | 734,600 | 7 |
| ARIZONA | | | | | | |
| Phoenix..... | 4,791,505 | 95 | 4,870,500 | 97 | 4,791,800 | 95 |
| Tucson..... | 3,234,475 | 77 | 3,360,000 | 78 | 3,303,300 | 77 |
| Total.... | 8,025,980 | 172 | 8,230,500 | 175 | 8,095,100 | 172 |
| ARKANSAS | | | | | | |
| Booneville..... | 987,353 | 11 | 983,300 | 11 | 972,100 | 11 |
| Stuttgart..... | 248,724 | 4 | 228,300 | 4 | 224,700 | 4 |
| Total.... | 1,236,077 | 15 | 1,211,600 | 15 | 1,196,800 | 15 |
| CALIFORNIA | | | | | | |
| Albany..... | 17,481,620 | 315 | 16,757,900 | 318 | 17,399,400 | 314 |
| Brawley..... | 433,399 | 10 | 447,600 | 10 | 445,200 | 10 |
| Davis..... | 1,069,780 | 20 | 1,103,900 | 20 | 1,372,400 | 20 |
| Fresno..... | 3,005,355 | 59 | 3,281,700 | 60 | 3,235,800 | 59 |
| Pasadena..... | 1,597,328 | 24 | 1,972,400 | 24 | 1,958,000 | 24 |
| Riverside..... | 2,852,691 | 63 | 2,884,900 | 64 | 2,913,700 | 63 |
| Salinas..... | 1,450,958 | 34 | 1,553,400 | 34 | 1,529,000 | 34 |
| San Francisco..... | 2,765,010 | 17 | 3,415,600 | 17 | 3,381,300 | 17 |
| Shafter..... | 1,177,018 | 23 | 1,170,700 | 23 | 1,151,700 | 23 |
| Total.... | 31,833,159 | 565 | 32,588,100 | 570 | 33,386,500 | 564 |
| COLORADO | | | | | | |
| Akron..... | 739,810 | 14 | 747,400 | 14 | 734,900 | 14 |
| Denver..... | 2,001,429 | 43 | 2,024,500 | 43 | 1,993,400 | 43 |
| Fort Collins..... | 6,299,148 | 122 | 7,586,400 | 125 | 7,657,200 | 122 |
| Total.... | 9,040,387 | 179 | 10,358,300 | 182 | 10,385,500 | 179 |
| DELAWARE | | | | | | |
| Georgetown..... | 560,797 | 11 | 568,200 | 11 | 559,200 | 11 |
| Newark..... | 518,276 | 13 | 530,300 | 13 | 521,100 | 13 |
| Total.... | 1,079,073 | 24 | 1,098,500 | 24 | 1,080,300 | 24 |
| DISTRICT OF COLUMBIA | | | | | | |
| Program..... | 3,243,548 | 80 | 3,091,100 | 81 | 3,041,200 | 80 |
| Headquarters | | | | | | |
| Agency Management | | | | | | |
| Services..... | 25,431,924 | 494 | 24,571,700 | 505 | 23,994,500 | 505 |
| Centrally Fi- | | | | | | |
| nanced Program... | 10,433,022 | - - | 12,500,000 | - - | 12,500,000 | - - |
| Subtotal... | 35,864,946 | 494 | 37,071,700 | 505 | 36,494,500 | 505 |
| Total..... | 39,108,494 | 574 | 40,162,800 | 586 | 39,535,700 | 585 |

STATEMENT OF OBLIGATIONS AND STAFF-YEARS BY LOCATION

| Location | Actual 1984 | | Estimated 1985 | | Estimate 1986 | |
|----------------------------|-------------|-------------|----------------|-------------|---------------|-------------|
| | Dollars | Staff-Years | Dollars | Staff-Years | Dollars | Staff-Years |
| FLORIDA | | | | | | |
| Belle Glade..... | 184,033 | 5 | 186,500 | 5 | 184,000 | 5 |
| Brooksville..... | 364,844 | 6 | 440,400 | 6 | 434,800 | 6 |
| Canal Point..... | 815,998 | 25 | 841,700 | 25 | 826,700 | 25 |
| Fort Lauderdale..... | 509,742 | 9 | 533,900 | 9 | 527,600 | 9 |
| Gainesville..... | 8,271,749 | 142 | 8,385,500 | 144 | 8,358,500 | 142 |
| Lake Alfred..... | 126,117 | 3 | 128,800 | 3 | 126,400 | 3 |
| Miami..... | 1,011,262 | 31 | 1,120,500 | 31 | 1,190,500 | 31 |
| Orlando..... | 2,702,489 | 62 | 3,799,200 | 63 | 3,935,400 | 62 |
| Winter Haven..... | 902,139 | 20 | 930,300 | 20 | 913,300 | 20 |
| Total.... | 14,888,373 | 303 | 16,366,800 | 306 | 16,497,200 | 303 |
| GEORGIA | | | | | | |
| Athens..... | 9,412,870 | 194 | 11,005,200 | 197 | 10,965,500 | 192 |
| Byron..... | 1,707,362 | 34 | 1,673,400 | 34 | 1,647,200 | 34 |
| Dawson..... | 964,148 | 25 | 959,900 | 25 | 942,600 | 25 |
| Experiment..... | 681,382 | 5 | 663,400 | 5 | 657,800 | 5 |
| Savannah..... | 2,483,058 | 58 | 2,528,600 | 59 | 2,484,500 | 58 |
| Tifton..... | 6,441,282 | 110 | 6,011,700 | 112 | 6,063,500 | 110 |
| Watkinsville..... | 1,464,545 | 26 | 1,502,800 | 26 | 1,481,500 | 26 |
| Total.... | 23,154,647 | 452 | 24,345,000 | 458 | 24,242,600 | 450 |
| HAWAII, Honolulu..... | 2,088,959 | 42 | 2,483,000 | 44 | 2,611,100 | 43 |
| IDAHO | | | | | | |
| Aberdeen..... | 715,834 | 6 | 804,400 | 6 | 796,200 | 6 |
| Boise..... | 1,091,522 | 20 | 1,063,500 | 20 | 1,047,000 | 20 |
| Dubois..... | 1,365,157 | 16 | 1,278,600 | 16 | 1,266,900 | 16 |
| Kimberly (Twin Falls)..... | 2,049,949 | 43 | 2,140,600 | 44 | 2,105,100 | 43 |
| Total.... | 5,222,462 | 85 | 5,287,100 | 86 | 5,215,200 | 85 |
| ILLINOIS | | | | | | |
| Peoria..... | 17,920,784 | 313 | 18,767,700 | 317 | 18,462,200 | 312 |
| Urbana..... | 2,871,436 | 46 | 3,073,500 | 47 | 3,032,800 | 46 |
| Total.... | 20,792,220 | 359 | 21,841,200 | 364 | 21,495,000 | 358 |
| INDIANA | | | | | | |
| Lafayette..... | 2,807,324 | 30 | 3,087,300 | 30 | 3,056,400 | 30 |
| Vincennes..... | 545,577 | 8 | 369,000 | 8 | 363,100 | 8 |
| Total.... | 3,352,901 | 38 | 3,456,300 | 38 | 3,419,500 | 38 |
| IOWA | | | | | | |
| Ames..... | 16,480,100 | 311 | 17,325,400 | 315 | 17,324,900 | 310 |
| Ankeny..... | 520,851 | 10 | 572,000 | 10 | 563,700 | 10 |
| Total..... | 17,000,951 | 321 | 17,897,400 | 325 | 17,888,600 | 320 |
| KANSAS, Manhattan..... | 3,243,274 | 64 | 3,489,000 | 65 | 3,435,200 | 64 |
| KENTUCKY, Lexington..... | 861,313 | 22 | 916,800 | 22 | 889,100 | 22 |

STATEMENT OF OBLIGATIONS AND STAFF-YEARS BY LOCATION

| Location | Actual 1984 | | Estimated 1985 | | Estimated 1986 | |
|-------------------------------|-------------|-------------|----------------|-------------|----------------|-------------|
| | Dollars | Staff-Years | Dollars | Staff-Years | Dollars | Staff-Years |
| LOUISIANA | | | | | | |
| Baton Rouge..... | 1,412,104 | 28 | 1,464,200 | 28 | 1,439,900 | 28 |
| Houma..... | 1,282,741 | 32 | 1,341,800 | 32 | 1,313,200 | 31 |
| Lake Charles..... | 368,663 | 6 | 342,700 | 6 | 341,200 | 6 |
| New Orleans..... | 15,683,126 | 278 | 15,834,800 | 281 | 15,832,200 | 283 |
| Total..... | 18,746,634 | 344 | 18,983,500 | 347 | 18,926,500 | 348 |
| MAINE, Orono..... | | | | | | |
| | 451,341 | 10 | 452,600 | 10 | 446,600 | 10 |
| MARYLAND | | | | | | |
| Beltsville..... | 69,395,304 | 1,421 | 68,869,700 | 1,432 | 68,890,800 | 1,410 |
| Frederick..... | 1,949,369 | 36 | 1,985,000 | 36 | 1,957,500 | 36 |
| Glenn Dale..... | 620,359 | 12 | 517,300 | 12 | 509,800 | 12 |
| Hyattsville..... | 356,698 | 11 | 404,200 | 11 | 396,600 | 11 |
| Total..... | 72,321,730 | 1,480 | 71,776,200 | 1,491 | 71,754,700 | 1,469 |
| MASSACHUSETTS | | | | | | |
| Boston..... | 8,976,167 | 3 | 10,785,900 | 3 | 10,766,300 | 3 |
| Natick..... | 190,859 | 3 | - - | - - | - - | - - |
| Otis AFB..... | 226,443 | 2 | 254,000 | 2 | 251,500 | 2 |
| Total..... | 9,393,469 | 8 | 11,039,900 | 5 | 11,017,800 | 5 |
| MICHIGAN, East Lansing | | | | | | |
| | 3,010,265 | 60 | 3,115,400 | 61 | 3,064,200 | 60 |
| MINNESOTA | | | | | | |
| East Grand Forks.... | 417,413 | 9 | 406,200 | 9 | 399,500 | 9 |
| Minneapolis..... | 556,776 | 9 | 1,611,000 | 9 | 1,633,800 | 9 |
| Morris..... | 1,574,732 | 32 | 1,560,400 | 32 | 1,536,500 | 32 |
| St. Paul..... | 2,450,896 | 51 | 2,520,700 | 52 | 2,624,600 | 51 |
| Total..... | 4,999,817 | 101 | 6,098,300 | 102 | 6,194,400 | 101 |
| MISSISSIPPI | | | | | | |
| Oxford..... | 2,605,889 | 65 | 2,959,300 | 66 | 2,919,500 | 66 |
| Poplarville..... | 442,465 | 9 | 377,500 | 9 | 370,700 | 9 |
| Mississippi State... | 6,058,618 | 101 | 5,875,800 | 103 | 5,787,500 | 103 |
| Stoneville..... | 7,041,265 | 167 | 8,432,600 | 169 | 8,534,900 | 169 |
| Total..... | 16,148,237 | 342 | 17,645,200 | 347 | 17,612,600 | 347 |
| MISSOURI, Columbia.... | | | | | | |
| | 4,045,572 | 92 | 3,980,400 | 93 | 3,916,600 | 92 |
| MONTANA | | | | | | |
| Bozeman..... | 938,764 | 19 | 983,200 | 19 | 966,600 | 19 |
| Miles City..... | 1,721,444 | 12 | 1,593,900 | 12 | 1,581,200 | 12 |
| Total..... | 2,660,208 | 31 | 2,577,100 | 31 | 2,547,800 | 31 |

STATEMENT OF OBLIGATIONS AND STAFF-YEARS BY LOCATION

| Location | Actual 1984 | | Estimated 1985 | | Estimated 1986 | |
|--------------------|-------------|-------------|----------------|-------------|----------------|-------------|
| | Dollars | Staff-Years | Dollars | Staff-Years | Dollars | Staff-Years |
| NEBRASKA | | | | | | |
| Clay Center..... | 7,363,529 | 60 | 7,454,500 | 61 | 7,510,600 | 60 |
| Lincoln..... | 2,597,660 | 41 | 2,732,300 | 41 | 2,693,200 | 41 |
| Total.... | 9,961,189 | 101 | 10,186,800 | 102 | 10,203,800 | 101 |
| NEVADA, Reno..... | 620,868 | 11 | 627,300 | 11 | 617,700 | 11 |
| NEW JERSEY | | | | | | |
| New Brunswick..... | 477,675 | 10 | 490,500 | 10 | 483,000 | 10 |
| NEW MEXICO | | | | | | |
| Las Cruces..... | 1,211,200 | 27 | 1,259,400 | 27 | 1,237,700 | 27 |
| NEW YORK | | | | | | |
| Geneva..... | 405,772 | 6 | 444,900 | 6 | 574,000 | 6 |
| Ithaca..... | 2,867,245 | 33 | 3,003,100 | 33 | 2,971,700 | 33 |
| Plum Island..... | 8,692,146 | 262 | 8,764,400 | 265 | 8,687,300 | 262 |
| Total.... | 11,965,163 | 301 | 12,212,400 | 304 | 12,233,000 | 301 |
| NORTH CAROLINA | | | | | | |
| Oxford..... | 1,882,561 | 33 | 1,933,900 | 33 | 2,082,400 | 36 |
| Raleigh..... | 3,988,787 | 75 | 4,064,200 | 75 | 4,009,000 | 75 |
| Total.... | 5,871,348 | 108 | 5,998,100 | 108 | 6,091,400 | 111 |
| NORTH DAKOTA | | | | | | |
| Fargo..... | 6,420,060 | 118 | 6,768,500 | 120 | 6,669,400 | 119 |
| Grand Forks..... | 5,044,913 | 27 | 5,573,200 | 27 | 5,543,600 | 27 |
| Mandan..... | 2,448,126 | 48 | 2,788,900 | 49 | 2,748,200 | 48 |
| Total.... | 13,913,099 | 193 | 15,130,600 | 196 | 14,961,200 | 194 |
| OHIO | | | | | | |
| Columbus..... | 120,657 | 4 | 197,200 | 4 | 195,000 | 4 |
| Coshocton..... | 1,120,246 | 21 | 831,300 | 21 | 817,200 | 21 |
| Delaware..... | 597,191 | 7 | 567,500 | 7 | 558,500 | 7 |
| Wooster..... | 1,474,532 | 33 | 1,512,300 | 33 | 1,486,000 | 33 |
| Total.... | 3,312,626 | 65 | 3,108,300 | 65 | 3,056,700 | 65 |
| OKLAHOMA | | | | | | |
| Durant..... | 1,822,252 | 43 | 1,912,000 | 44 | 1,881,400 | 43 |
| El Reno..... | 1,420,931 | 31 | 1,474,400 | 31 | 1,453,100 | 31 |
| Lane..... | - - | -- | 292,000 | 2 | 291,300 | 2 |
| Stillwater..... | 1,822,999 | 30 | 1,833,700 | 30 | 1,806,600 | 30 |
| Woodward..... | 792,298 | 16 | 737,000 | 16 | 725,100 | 16 |
| Total.... | 5,858,480 | 120 | 6,249,100 | 123 | 6,157,500 | 122 |
| OREGON | | | | | | |
| Burns..... | 196,953 | 2 | 214,200 | 2 | 211,600 | 2 |
| Corvallis..... | 2,311,055 | 38 | 2,500,700 | 38 | 2,827,200 | 38 |
| Pendleton..... | 898,827 | 18 | 965,200 | 18 | 948,800 | 18 |
| Portland..... | 1,091,575 | 18 | 1,637,500 | 18 | 1,660,100 | 18 |
| Total.... | 4,498,410 | 76 | 5,317,600 | 76 | 5,647,700 | 76 |

STATEMENT OF OBLIGATIONS AND STAFF-YEARS BY LOCATION

| Location | Actual 1984 | | Estimated 1985 | | Estimated 1986 | |
|----------------------|-------------|-------------|----------------|-------------|----------------|-------------|
| | Dollars | Staff-Years | Dollars | Staff-Years | Dollars | Staff-Years |
| PENNSYLVANIA | | | | | | |
| University Park..... | 2,540,672 | 47 | 2,658,500 | 48 | 2,616,000 | 47 |
| Wyndmoor..... | 14,191,375 | 289 | 15,367,000 | 293 | 15,123,100 | 287 |
| Total..... | 16,732,047 | 336 | 18,025,500 | 341 | 17,739,100 | 334 |
| SOUTH CAROLINA | | | | | | |
| Charleston..... | 1,778,706 | 45 | 1,836,800 | 46 | 1,804,600 | 45 |
| Clemson..... | 1,566,188 | 27 | 1,752,300 | 27 | 1,732,200 | 27 |
| Florence..... | 1,932,601 | 44 | 1,696,100 | 45 | 1,666,300 | 44 |
| Total..... | 5,277,495 | 116 | 5,285,200 | 118 | 5,203,100 | 116 |
| SOUTH DAKOTA | | | | | | |
| Brookings-Madison... | 1,527,254 | 35 | 1,528,500 | 35 | 1,505,500 | 35 |
| TENNESSEE | | | | | | |
| Greenville..... | 48,074 | 1 | 51,700 | 1 | 51,200 | 1 |
| Jackson..... | 125,616 | 3 | 131,600 | 3 | 129,500 | 3 |
| Knoxville..... | 373,907 | 9 | 383,700 | 9 | 115,000 | 3 |
| Lewisburg..... | 142,729 | 3 | 148,400 | 3 | 146,300 | 3 |
| Total..... | 690,326 | 16 | 715,400 | 16 | 442,000 | 10 |
| TEXAS | | | | | | |
| Beaumont..... | 692,953 | 17 | 798,600 | 17 | 785,500 | 17 |
| Brownwood..... | 544,731 | 12 | 549,700 | 12 | 540,800 | 12 |
| Bushland..... | 2,239,383 | 41 | 2,214,000 | 41 | 2,184,900 | 41 |
| College Station..... | 7,168,880 | 130 | 8,042,400 | 133 | 8,101,700 | 130 |
| Houston..... | 2,968,195 | 5 | 3,231,100 | 5 | 3,224,400 | 5 |
| Kerrville..... | 2,849,991 | 56 | 3,013,400 | 57 | 2,970,700 | 56 |
| Lubbock..... | 1,825,060 | 35 | 2,062,200 | 35 | 2,035,100 | 35 |
| Temple..... | 2,708,528 | 50 | 2,752,800 | 51 | 2,711,000 | 50 |
| Weslaco..... | 5,462,219 | 123 | 5,480,700 | 125 | 5,362,800 | 120 |
| Total..... | 26,459,940 | 469 | 28,144,900 | 476 | 27,916,900 | 466 |
| UTAH, Logan..... | 2,823,194 | 58 | 3,083,500 | 59 | 3,035,400 | 58 |
| VIRGINIA | | | | | | |
| Richmond..... | 150,619 | 5 | 173,700 | 5 | - - | -- |
| Suffolk (Holland)... | 462,261 | 13 | 486,200 | 13 | 477,700 | 13 |
| Total..... | 612,880 | 18 | 659,900 | 18 | 477,700 | 13 |
| WASHINGTON | | | | | | |
| Prosser..... | 1,962,632 | 39 | 2,162,400 | 39 | 2,130,600 | 39 |
| Pullman..... | 3,880,011 | 69 | 4,693,300 | 70 | 4,767,300 | 69 |
| Wenatchee..... | 912,204 | 19 | 983,700 | 19 | 968,100 | 19 |
| Yakima..... | 2,180,190 | 29 | 2,384,800 | 29 | 2,348,900 | 29 |
| Total..... | 8,935,037 | 156 | 10,224,200 | 157 | 10,214,900 | 156 |

STATEMENT OF OBLIGATIONS AND STAFF-YEARS BY LOCATION

| Location | Actual 1984 | | Estimated 1985 | | Estimated 1986 | |
|--------------------------------|-------------|-------------|----------------|-------------|----------------|-------------|
| | Dollars | Staff-Years | Dollars | Staff-Years | Dollars | Staff-Years |
| WEST VIRGINIA | | | | | | |
| Beckley..... | 1,987,061 | 19 | 2,087,500 | 19 | 2,066,300 | 19 |
| Kearneysville..... | 2,748,973 | 23 | 3,025,200 | 23 | 2,998,800 | 23 |
| Total..... | 4,736,034 | 42 | 5,112,700 | 42 | 5,065,100 | 42 |
| WISCONSIN, Madison..... | 4,830,915 | 54 | 4,487,800 | 55 | 4,443,000 | 54 |
| WYOMING | | | | | | |
| Cheyenne..... | 406,278 | 15 | 381,500 | 15 | 373,400 | 15 |
| Laramie..... | 320,543 | 9 | 307,100 | 9 | 301,800 | 9 |
| Total..... | 726,821 | 24 | 688,600 | 24 | 675,200 | 24 |
| PUERTO RICO | | | | | | |
| Mayaguez..... | 1,323,344 | 43 | 1,402,800 | 43 | 1,520,000 | 43 |
| Rio Piedras (San Juan)..... | 365,275 | 7 | 397,300 | 7 | 390,400 | 7 |
| Total..... | 1,688,619 | 50 | 1,800,100 | 50 | 1,910,400 | 50 |
| VIRGIN ISLANDS | | | | | | |
| St. Croix..... | 218,734 | 6 | 221,800 | 6 | 218,200 | 6 |
| OTHER COUNTRIES | | | | | | |
| Argentina, | | | | | | |
| Buenos Aires..... | 94,997 | 1 | 218,700 | 1 | 218,000 | 1 |
| France, Sevres..... | 635,500 | 2 | 754,900 | 2 | 753,200 | 2 |
| Italy, Rome..... | 505,103 | 2 | 519,600 | 2 | 518,200 | 2 |
| Kenya, Mugaga | 137,010 | 2 | 142,900 | 2 | 142,300 | 2 |
| Korea, Seoul..... | 121,262 | 3 | 125,900 | 3 | 125,300 | 3 |
| Mexico, Tuxtla | | | | | | |
| Gutierrez..... | 870,560 | 9 | 906,400 | 9 | 895,900 | 9 |
| Netherlands, | | | | | | |
| Rotterdam..... | 272,860 | 2 | 316,100 | 2 | 315,100 | 2 |
| Thailand, Chiang Mai | 207,527 | 1 | 245,700 | 1 | 245,200 | 1 |
| Guatemala, | | | | | | |
| Guatemala City.... | 133,800 | 1 | 133,800 | 1 | 133,300 | 1 |
| Total..... | 2,978,619 | 23 | 3,364,000 | 23 | 3,346,500 | 23 |

STATEMENT OF OBLIGATIONS AND STAFF-YEARS BY LOCATION

| Location | Actual 1984 | Staff- Years | Estimated 1985 | Staff- Years | Estimated 1986 | Staff- Years |
|--|-------------|-----------------|---------------------------|-----------------|----------------|-----------------|
| | Dollars | | Dollars | | Dollars | |
| Extramural and Program locations to be determined..... | 3,417,294 | - - | 2,058,700 | - - | 2,058,700 | - - |
| Contingency Research Fund..... | <u>a/</u> | - - | 1,000,000 | - - | 1,000,000 | - - |
| Repair & Maintenance of Facilities..... | 11,038,999 | - - | 11,092,000 | - - | 11,092,000 | - - |
| Unobligated Balance..... | 3,555,975 | - - | - - | - - | - - | - - |
| Subtotal, Available or Estimate..... | 470,021,621 | 8,150 | 486,636,000 | 8,242 | 485,007,000 | 8,142 |
| Allotment to Forest Service..... | +384,779 | - - | +386,000 | - - | +386,000 | - - |
| Transfer to Cooperative State Research Service.. | +7,800,000 | - - | +7,800,000 | - - | - - | - - |
| Transfer to Extension Service..... | - - | - - | - - | - - | -107,000 | - - |
| TOTAL, Appropriation..... | 478,206,400 | 8,150 | 494,822,000 ^{a/} | 8,242 | 485,286,000 | 8,142 |

a/ A request has been submitted to Congress to rescind \$1,313,000.

AGRICULTURAL RESEARCH SERVICE

STATUS OF PROGRAM

Agricultural Research Service (ARS) conducts mission-oriented research to perpetually ensure an abundance of high-quality, nutritious, reasonably priced food and other agricultural products to meet domestic and world needs while maintaining environmental quality. ARS uses coordinated, interdisciplinary approaches to conduct basic and applied research pertaining to research on soil and water conservation, plant productivity, animal productivity, commodity conversion delivery, human nutrition, and integration of agricultural systems.

Research is conducted at numerous locations in the United States, Puerto Rico, Virgin Islands, and several foreign countries. When appropriate, the research is conducted in cooperation with the State Agricultural Experiment Stations, other State and Federal agencies, and private institutions.

RESEARCH ON SOIL AND WATER CONSERVATION

Current activities: This research is conducted to develop strategies and technologies that not only can be profitably adapted by today's agricultural producers but also result in conserving the production capacity of our soil, water, and air resources to sustain future generations. The research program includes development of management systems that can be used by farmers, extension specialists, and agri-industry to make decisions that will maintain profits while minimizing adverse impacts on the productivity of the system and on the environment. Investigations include research aimed at reducing salt damage to soils, crops, and water; improving the efficiency of irrigation and drainage of agricultural lands; developing tillage practices for reducing soil erosion and for improving soil properties and crop growth; managing and using precipitation and solar energy for crop production; reclaiming and revegetating land areas disturbed by man; conserving soil fertility for increased production and nutritional quality of plants and animals; preventing pollution of and improving the quality of soil, water and air; controlling erosion by water, wind, and sedimentation; and conserving and managing agricultural water resources.

Selected examples of recent progress:

High concentrations of plant nutrients in groundwater are associated with normal geologic, hydrologic, and agricultural land use. A plant nutrient budget based on farmer survey in conjunction with a hydrologic budget, is effective in predicting the observed concentration of nutrients in groundwater and base flow to streams. The approach uses data that are either readily available or can be estimated from other information. The procedure will be useful to consulting engineers and those interested in surveying the extent of problems or locating primary land use areas contributing to pollution problems.

Subsurface drainage reduces runoff and loss of soil and nutrients. High water tables not only inhibit crop production and trafficability, but also increase runoff and loss of soil and plant nutrients. Runoff, soil loss, and nutrient losses were found to be less where the water table was lowered in subsurface drains in a low-lying, high rainfall area in Louisiana. High water tables in such areas are common, particularly in winter and spring when rainfall is high and evapotranspiration is low.

No-till reduces soil erosion and increases yield for cotton. After 11 years of experimental cropping in Oxford, Mississippi, conservation tillage system for cotton compared with conventional tillage reduced erosion by more than 70 percent, and increased seed cotton yield by 20 percent. These conservation tillage practices represent a significant step in helping to reduce soil loss to the tolerable levels established by the Soil Conservation Service.

Beef production systems improved by use of warm-season grasses. Research conducted in southwestern Pennsylvania showed that the use of warm-season grasses such as switchgrass and bluestem can significantly aid beef producers by increasing the amount of forage available in July and August. The use of management practices that favor persistence of the warm-season grasses makes it possible to use grass mixtures and shift forage production into the season desired. The average forage availability in this study was 15% May, 55% July-August, and 30% October. The warm season grasses used fertilizer efficiently and permitted establishment of red clover by overseeding in early March.

Residue cover conserves water. Limited and erratic precipitation constrains crop yields on drylands in the Southern Great Plains. Irrigation increases yields, but the water in the Ogallala Aquifer is limited and is being depleted. Crop residues, especially from irrigated crops, maintained on the soil surface by conservation tillage methods significantly increased the storage of rainfall in the soil during a subsequent fallow year. Conserving this precipitation by effective use of crop residues reduced the irrigation requirement the next year and resulted in an economical crop production system and higher than normal yields.

Wind power used to assist in electrical pumping irrigation water. Because irrigation pumping coincides with summer peak electric demands, power companies reluctantly add new irrigation installations or they charge increased rates to the farmers. Electrical wind assist pumping is an alternative that reduces the quantity of electricity purchased while maintaining the ability to provide water at critical crop growth stages. Two wind turbines provided 77 percent of the energy consumed by a center pivot and irrigation pump, plus, provided some excess power each month. For minimum cost, however, some type of load management or control is needed to minimize the pumping time when no wind is available.

Versatile computer program for border-irrigation system developed. A computer program has been developed to guide farmers in managing irrigation systems. The program solves the border irrigation problem for systems of different levels of complexity and cost. It handles a variable-in-flow hydrograph and a variable bottom slope, and it provides a variety of outputs to meet the user's needs. The development and documentation of this program represents a significant advancement in the state of the art in water management for surface irrigation.

Conversion of riparian forests to croplands along streams can increase nutrient loading. Streamside forests in agricultural watersheds of the Coastal Plains are effective in retaining nitrogen (N), phosphorus (P), calcium, and magnesium. Total replacement of riparian forest with crops would increase loads of all nutrients in stream flow except organic N and total P. Land managers can maintain the nutrient-filtering capacity of streamside forest by selectively harvesting hardwoods and maintaining the present hydrologic regime.

Conservation production systems to minimize soil erosion and maintain yields in the Southern Piedmont. A cropping and tillage system experiment that compared conventional with two conservation tillage treatments in a 4-year rotation of grain sorghum, soybeans, and wheat showed that yields could be maintained with conservation tillage. Results suggest that rotation of crop, tillage, and herbicide are all essential for effective conservation tillage production systems in this region.

Procedures developed for predicting corn planting dates for moldboard and no-till tillage systems in the Corn Belt. A procedure was developed to forecast earliest corn planting date to achieve 75% emergence in 14 days or less for a given location in the Corn Belt. The procedure uses soil-water status and a 90- or a 30-day outlook of precipitation and air temperature by the National Weather Service. Two sets of nomographs were used to delineate areas with similar corn planting dates for two tillage systems, based on air and soil temperatures and soil-water matric potential. A procedure based on the nomographs was also suggested to match corn hybrids with tillage systems and spring climate.

RESEARCH ON PLANT PRODUCTIVITY

Current Activities: Emphasis is on reducing the relative costs of producing crop commodities and improving quality to ensure an adequate supply and to maintain competitiveness in domestic and foreign markets. New technologies are being developed to reduce the costs of protecting our food, fiber, and feed crops from insect, nematode, disease, and weed pests. Improved germplasm and varieties are being released that are more tolerant to drought, temperature extremes, soil salinity, and other stress factors that often drastically reduce planned production. Plant growth regulators, harvest aid chemicals, and other emerging technologies are being investigated to improve production efficiency and commodity quality.

Selected Examples of Progress:

Germplasm Resources Information Network now available to scientific community. Information regarding the location, characteristics, and availability of germplasm accessions within the U.S. National Plant Germplasm System is now available to all scientists through the Germplasm Resources Information Network (GRIN). This computerized database management system serves two broad groups of "information users": (1) the suppliers (such as curators and staff of the Plant Introduction Stations) who acquire, maintain, and distribute germplasm and data; and (2) those who use the germplasm resources and data these include public and private plant breeders as well as other interested scientists and researchers.

Plant Gene Expression Center established for research in biotechnology. The Agricultural Research Service, the University of California/Berkeley, and the California Agricultural Experiment Station have jointly established the Plant Gene Expression Center (PGEN) at Albany, California. Research at the PGEN will focus on identifying the mechanisms that turn a given gene's activity on or off. The PGEN will assemble experts in the various facets of the field to unravel the complex biology of plant gene expression, stimulate and coordinate complementary research among public and private research groups, and ensure that the knowledge is quickly transferred to the farm. PGEN's mission is to convert fundamental research into new genetics tools to improve the yield and quality of crop plants and to render them resistant to insects, diseases, and environmental stresses.

Genetic engineering of improved field and horticultural crops gives crop breeders powerful new tool. Important progress is being made to genetically engineer field and horticultural crops. Methods have been developed to transfer single genes, gene clusters, or whole genomes from one plant species or genus to another. These new techniques now permit the transfer of economically important traits between sexually incompatible plant species. This technology is helping to lay the foundation for increasing the genetic potential of major crops.

Improved crested wheatgrass increases productivity of semiarid rangelands. The first interspecific hybrid of crested wheatgrass -- an important forage crop in the western United States -- has been released. The new cultivar, Hycrest, was selected for adaptation to the environmental stresses encountered on Intermountain rangelands. The hybrid shows superiority to other presently available cultivars, particularly in terms of productivity under semiarid conditions. The new hybrid is expected to make a major impact in the improvement of rangelands in the sagebrush ecosystem, and good stands have also been obtained in drought areas that receive less than 10 inches of annual precipitation.

Breeding soybeans for resistance to soybean cyst nematode. The soybean cyst nematode causes production losses estimated at \$150 million annually. Three new soybean varieties have now been released for commercial production. Two of these, CN 210 and CN 290, are resistant to race 3 of the soybean cyst nematode. Because of their resistance and early maturity, they extend the production area about 150 miles farther north on cyst-infested fields in the central Midwest. The third variety, Epps, has been released for production in the south, and it is resistant to races 3 and 4 of the soybean cyst nematode, soybean mosaic virus, and phytophthora rot. Epps has the potential to increase yields by as much as 10 bushels per acre, or \$60 per acre at current soybean prices.

Breeding sugarbeets for characteristics that reduce storage losses. Mechanical cleaning equipment severely damages sugarbeet roots, provides easy entry for bacteria and fungi, and causes increased respiration that uses up sucrose. Improved "soil-free" sugarbeet breeding lines have now been developed that permit harvesting equipment to be modified so as to eliminate damage and put clean roots in storage piles. This new development could reduce storage pile losses by as much as 50%, resulting in an estimated annual saving of more than \$1 million.

Breeding for reduction of objectionable flavors and poor stability of soybean oil. Soybean oil, the major edible vegetable oil in the U.S., contains high levels (7-9%) of linolenic acid. This trait has been associated with objectionable flavors and poor stability of the oil. A mutation breeding program resulted in the identification of a mutant with only 4.3% linolenic acid. The mutant performs similarly to the soybean cultivar Century (the standard of comparison) in days to maturity, plant height, and resistance to lodging, or falling over. The low linolenic acid content was stable in two successive generations, indicating that this was a heritable change controlling linolenic acid content of the oil.

Release of spring wheat variety that is resistant to Hessian fly. Guard, a hard red spring wheat variety with resistance to Hessian fly, was released to South Dakota growers in 1983. Breeding research began as a result of the devastating 1978 outbreak in South Dakota of Hessian fly, which reduced wheat yields by 10 million bushels at a cost of some \$33 million. Guard is the only available hard red spring wheat known to have resistance to

Hessian fly, and its name denotes this unique trait. Guard was grown on 20,000 acres in South Dakota in 1984 and is expected to increase to more than 250,000 acres in 1985.

Increase of soybean yields through use of furrow irrigation on sandy loam soil. Soybean irrigation is not common in the South. Research studies were conducted on sandy loam soil to determine the effect and timing of furrow irrigation on soybean yields and monetary returns. For treatments that were irrigated at both the bloom and pod fill stages, the yields increased an average of 19.4 bushels per acre. This treatment provided the highest net returns per acre (\$82.49). The results provide important information to soybean farmers in the Mississippi Delta who are concerned about obtaining the maximum level of available water from rainfall and supplemental irrigation.

Self-rooted apple trees created by tissue culture for planting high-density orchards. Conventional grafting is too expensive for high-density orchards, which are desirable for the economic production of fruit crops. A new method has been developed for efficiently rooting shoots of apple in sterile cultures. The method, which consists of a greatly simplified culture medium with dark incubation at 30°C, results in 80-90% rooting. Self-rooted trees created by tissue culture can be planted economically at the rate of 700 to 1,000 trees per acre. The trees are being distributed to experiment stations for replicated field trials to determine their productivity in comparison with conventionally grafted trees.

Collection from China of more efficient nitrogen-fixing soybean rhizobia. U.S. agriculture depends on plant germplasm and microorganisms that originated in foreign countries. Many of the bacteria used for legume inoculation were collected years ago, and little effort has been made to widen this germplasm base for increased efficiency and replacement of costly nitrogen fertilizers. Recently, exotic *Rhizobium* germplasm was acquired from China as part of the overall effort to collect, characterize, and use beneficial *Rhizobium* for agriculture. This germplasm has been evaluated on some commercial U.S. cultivars, and several isolates are highly efficient and capable of increasing soybean yields. The use of these efficient bacteria can increase the efficiency of legume production by replacing the cost of nitrogen from the soil or from fertilizers.

Increased yields with semidwarf soybeans that reduce yield barriers caused by lodging. Soybean plant lodging, or falling over, is a barrier to increased yields because of disruption to the leaf canopy and reduction of photosynthesis and seed yield. To prevent lodging, semidwarf (shorter) soybean varieties have been developed for production in the Midwest. Research has resulted in a total production system (high yield fields, 7" row width as opposed to the 30" width for tall varieties, and higher seeding rates) that has maximized yields to the point that the semidwarf variety production system has great potential for acceptance by Midwest growers. The solid-seeded semidwarf system averages 28% higher yield than the tall variety system, currently planted in about 80% of the Midwest soybean fields. Thus, the solid-seeded semidwarf production system is expected to have a major impact on increasing future soybean yields in the Midwest.

Improved management practices for rice increase farm profits \$25 million. New systems are now available for improved rice production. Preplanting, preemergence, and postemergence application of individual herbicides,

herbicide mixtures, plant pathogens, water management, fertilizer practices, and other integrated weed management practices have increased rice yields by 10% and eliminated the need for two herbicide applications on 500,000 acres of rice in the South. The increased grain yield and reduced weed control costs have increased net profits of rice growers by \$25 million annually.

Improved leafy spurge control. Outstanding progress has been made in developing improved chemical weed control practices for controlling leafy spurge, a serious noxious weed that damages more than 3 million acres of pastures and rangelands in the central and western portions of the U.S. The use of combinations of herbicides and plant growth regulators and new application techniques increased the penetration, absorption, and translocation of the herbicides, reduced the rates per acre required for control, increased effectiveness for control of leafy spurge, reduced the cost of control, and reduced risks to the environment.

Effective biological control of root diseases of wheat. The application of beneficial bacteria as seed treatments has proved to be a new and ecologically sound approach for controlling root diseases of wheat. Tests conducted in Washington State demonstrated that these beneficial bacteria would enhance wheat growth. Four different strains, when applied as seed treatments, increased the yield by 26, 20, 10, and 2% respectively. The growth response appears to have resulted from the suppression of Pythium root rot.

Patent granted to ARS for developing the first biocontrol fungus against diseases. The ARS has been issued a patent on its discovery and development of a fungus that destroys disease-causing fungi in crops. The beneficial fungus, Trichoderma, was obtained from soil, developed to improve its effectiveness, and shown to control root rotting diseases of potatoes and vegetables in the field. The patent is the first on biological control of plant diseases and has been purchased by a private company.

New testing methods developed by ARS led to quick identification of the new canker disease of citrus. The ARS contributed significantly to solving the citrus canker crisis in Florida. The rapid and accurate diagnosis of this disease by ARS was made possible as a result of research already underway at Beltsville. The sophisticated tests not only identified the disease as canker, but also as a new strain of the bacterium. Tests were so thorough and conclusive that eradication steps were initiated without delay.

Control of the Colorado potato beetle on tomatoes with beneficial bacteria. Two experimental preparations of *Bacillus thuringiensis* (B.t.) were tested for efficacy against the Colorado potato beetle on tomatoes under commercial growing conditions. The bacterial treatments reduced the population of larvae and adults by more than 90%. Excellent yields were obtained while untreated plots were completely defoliated by beetles and no tomatoes were harvested.

Identified new insect growth regulator that protects cotton from boll weevil and bollworm. The chemical avermectin (Bla) MK 936 was identified as an insect growth regulator with potent activity against the boll weevil. The chemical was shown to negatively affect sex attractant production in

adult weevils, to effectively cause mortality in adults over a period of time, and to protect small plots of cotton from damage by adults. Additional laboratory studies determined the chemical to be highly active against the tobacco budworm and cotton bollworm. These growth regulation compounds may play an important role in insect control as present usage of the pyrethroid may be hampered by development of resistance in the insects.

Management of insect and disease pests with chemigation. Insect and disease damage to various crops was effectively controlled with chemical pesticides applied in center-pivot irrigation systems. Tobacco, peanuts, cowpeas, broccoli, spinach, and tomatoes were included in these experiments. This new technology provides an economic and effective way to protect crops from various pests including tobacco black-shank, root-knot nematode, leafminer, thrips, spider mite, and corn earworm.

ARS scientist develops rapid and inexpensive technique for detecting agricultural chemicals. The development of immunological methods that detect specific chemicals in plants, soil, and water at parts per trillion levels will permit thousands of samples to be evaluated per day in a single laboratory. Also, this technique will be invaluable in research to understand the mechanisms of action and fate of chemicals. Farmers and the general public need to know if agricultural chemical residues will interfere with crop rotations, multiple cropping, conservation tillage practices, and whether such residues are impairing our food supply, groundwater quality, or other components of the environment. The test is rapid, inexpensive, and its potential use by farmers is being evaluated. This new method of analyzing materials will enable the implementation of a low cost national monitoring program of agricultural chemicals in soil, water, and plants.

RESEARCH ON ANIMAL PRODUCTIVITY

Current activities: The demand for meat and animal products for human consumption continues to increase in the United States, as does the demand throughout the world for animals and animal products and germplasm from the United States. New technology is needed to enable livestock producers to increase production efficiency to assure a reliable and safe supply of animal protein while conserving resources and reducing production costs. ARS research is conducted to improve the efficiency of producing healthy animals and germplasm and safe, high-quality animal products for domestic needs and export market demand. Research emphasizes basic approaches to help meet long-term objectives such as control of pseudorabies, bluetongue, avian influenza, and arthropod vectors of disease; technology to prevent introduction of foreign livestock and poultry diseases; improvement of reproduction through integrated study of pathology, toxicology, physiology, nutrition, genetics, and management; and increased lean meat deposition through understanding and manipulating the cellular processes of protein and fat synthesis.

Selected examples of recent progress:

New method developed to permit expanded use of superior livestock. Livestock production efficiency could be dramatically improved by introducing new beneficial genes to produce clones of outstanding animals. The introduction of genes depends on the ability to view nuclei in embryos shortly after fertilization. Until now, nuclei in cattle and swine embryos could not be seen unless the embryos were first killed. Cow and pig

embryos were centrifuged at more than 15,000 times gravity, causing sedimentation of dense materials in the ova and allowing the visualization of cell nuclei. The embryos were not damaged, and normal healthy pigs were born after centrifuged embryos were transferred to surrogate mothers. The ability to produce transgenic livestock will permit animal breeders to significantly modify the genetic makeup of animals in one generation and will serve as a powerful tool to understand mechanisms of gene regulation in all animals.

Sorting of X and Y chromosome-bearing chinchilla spermatozoa. Presently, it is not possible to control the prenatal sex ratio in livestock as a means of increasing flexibility and efficiency in herd management. In studies with laboratory chinchillas, scientists have successfully separated the animals' X and Y chromosome-bearing spermatozoa into two populations based on their DNA content. This achievement moves science closer toward the ability to verify the sex of the X and Y sperm populations and to develop other biochemical markers for discriminating between the two populations. This accomplishment provides important new knowledge in the study of animals used for food production.

Heterosis increases longevity of beef cattle (crossbred cows remain in herd longer). Angus, Hereford, and Shorthorn purebreds and reciprocal crosses of these breeds were evaluated for differences in longevity. Crossbred cows remained in the herd an average of 16% longer than purebreds. This is attributed to fewer losses from infertility and death. Calves weaned from the crossbred cows also demonstrated a 14% increase in weight gain.

Lifetime (7 years) production of 1/4 and 1/2 Finnsheep ewes from domestic dams under range conditions. Finnish Landrace (Finnsheep) sheep, a highly prolific imported breed, were crossed with domestic breeds (Rambouillet, Targhee, and Columbia) to determine if lamb production under range conditions could be improved. All ewes were flock mated to Suffolk sires in accordance with typical commercial practice, and 1/4 and 1/2 Finncross ewes were clearly superior in lamb production. This superior trait was sustained throughout a typical productive lifetime of 7 years. Over this period, lambs weaned from 1/4 and 1/2 Finnsheep gained 59.7 and 100.9 kg more weight, respectively, than purebreds.

Controlled acclimatization of poultry reduces heat prostration losses. Heat prostration decreases performance or causes death in poultry production units and results in higher prices to consumers. The optimum growing temperature for converting feed to broiler meat is 21°C. In most U.S. production areas the ambient temperature exceeds 21°C for at least 3 months of the year. No mortality occurred in broiler chickens acclimatized at a 24-hour linear temperature cycle of 24 to 35 to 24°C before temperature stress (40.6°C) was imposed. A controlled acclimatization system can significantly improve the efficiency of poultry production systems.

Gelled media developed for rearing screwworm larvae. A gelled media has been developed that is based on the present screwworm diet. This media almost equals the production of the present media and requires less labor and costs. However, fewer larvae can be reared per unit of space, thereby increasing space requirements. This media could be used in plant production, if conditions require a change, and has the potential of reducing production costs by \$5 million per year.

Laboratory and field evaluation of avermectin against the imported fire ant. Avermectin, a natural product derived from soil microorganisms, was shown to be very effective in sterilizing laboratory and field colonies of the red imported fire ant. In field tests, avermectin baits applied as low as 50 milligrams of active ingredient per acre gave excellent control of natural populations of fire ants. Thus, another chemical tool has been shown to offer control of the imported fire ant.

Susceptibility of horn flies to permethrin and fenvalerate. The practice of controlling horn flies on cattle with insecticide-treated ear tags has become widespread and, for the most part, has been highly satisfactory. After cattlemen from certain localities reported diminishing levels of control with ear tags, a field kit was developed to test large numbers of horn flies for insecticide resistance with as little handling of the flies as possible. Two pyrethroids marketed in ear tags, fenvalerate and permethrin, were used in the study. Florida horn flies were 7 and 40 times more resistant to the insecticides, respectively, than the laboratory flies. Flies from Bexar County, Texas, were about half as resistant as the laboratory flies. This kit is now being used to monitor the resistance of horn flies in several States, and will be a useful tool in determining the mechanisms of resistance and in devising strategies to control resistant populations.

Humoral and colostral immune responses in pregnant gilts following pseudorabies virus vaccination. A killed pseudorabies virus (PRV) vaccine was injected through the skin of mammary glands of pregnant gilts by a jet gun in an effort to produce colostral antibodies that would protect offspring to market age. The vaccine stimulated humoral and colostral PRV neutralizing and precipitating antibodies. Weaned piglets from gilts vaccinated in each mammary gland at 6 and 3 weeks prior to parturition were protected against virulent PRV intranasal challenge. Eighty % of the piglets were protected at 6 months of age. These results suggest that passive immunity is particularly relevant to controlling PRV infections in piglets.

African serotype of bluetongue virus found in the United States poses potential threat to livestock industry. The first recognition has been made of an African serotype of bluetongue virus (BTV), serotype 2, in the U.S. This research illustrates the importance of developing systematic methods to detect newly introduced infectious agents that, initially, do not cause serious disease. The effect of the new genetic material on the existing population of BTV serotypes is likely to be BTV infections that are different from those observed in the past. An indication of the potential danger to the U.S. sheep industry, for example, is the fact that since 1960 serotype 2 has been the most frequent serotype associated with BTV of sheep in South Africa.

Influence of dietary crude protein and potassium concentration on the performance and health of feeder calves (shipped long distances). The increase of both protein and potassium concentrations in calf diets reduced the number of calf deaths from shipping fever. Analysis of blood samples indicated that calves with shipping fever metabolized body tissues for energy and protein. These calves also appeared to have impaired liver functions and mobilization of calcium from bones. These results indicate that lightweight (400 lb.) feeder calves should receive a diet containing between 14% and 16% protein and about 1.3% potassium during the first 2 weeks in the feedlot.

Effect of adding yeast culture to the receiving ration of stressed stocker calves. Stressed calves often have lower feed intakes than nonstressed calves. A lack of adequate daily nutrient intake is a negative influence on viral and bacterial resistance. Thus, quick recovery of optimum intake after a period of stress would increase the calf's natural resistance. Yeast culture added at the rate of 1 or 2 percent to the poststress diet of feeder calves tended to increase feed intake and weight gain and to effect better feed conversion than for calves not receiving yeast.

Diagnostic test developed for trichinosis in swine. Monoclonal antibodies were used to isolate several antigens of the parasite *Trichinella spiralis*. These antigens have been used by ARS scientists to develop a very sensitive diagnostic test for swine trichinosis. The test is of great value in field studies to locate infected herds for control. These antigens are also quite promising as vaccines to prevent infection in young swine. Other studies are directed at understanding the basic metabolism and biochemistry of the parasite. Recently, the enzymes involved in metabolizing sugar-containing molecules were isolated. This information could lead to the development of improved drugs to treat trichinosis in swine and in humans.

New research tools developed for studying neonatal diarrhea in swine. With the advent of confinement rearing practices in the swine industry, the problem of baby pig diarrhea has worsened. An important disease-causing agent, the coccidian *Isospora suis*, has recently been discovered by ARS scientists. An *in vitro* cultivation system was developed to aid researchers in devising control procedures for this disease. A baby pig model has also been developed for studying the disease process in infected baby pigs. These research tools will greatly enhance progress toward the development of an effective method for controlling this disease.

RESEARCH ON COMMODITY CONVERSION AND DELIVERY

Current Activities: The current post-harvest science and technology program is targeted to vital, problem-oriented research that contributes to the value of agricultural commodities and, therefore, the economic viability of the farmer, and research that supports the important role of agriculture in the balance of payments for the United States. The primary objectives of the program are to increase the quality and uses of agricultural commodities and materials; to ensure the safety of agricultural products and workers; to increase the opportunity for export of value-added products and eliminate impediments to commodity export; to reduce losses caused by pests, spoilage, and physical and environmental damage; and to increase the efficiency of processing, handling, and distribution systems.

Selected examples of recent progress:

New means to genetically manipulate the value of commodities. Genetic manipulation can increase both commodity values and returns to farmers by enabling crops to increase yields. For example, by controlling the genetic mechanisms that regulate oil production, it may be possible to increase the oil content of the soybean without significantly changing production costs. Acyl carrier protein (ACP), a key cofactor in plant lipid biosynthesis, is being used to study control of fatty acid production in the developing seed. Two new assays have been developed to measure active ACP and total ACP in plant tissues. The assays measure ACP levels at different stages of soybean development, and they have provided important insights into the control of lipid synthesis.

The first direct evidence of regulation of gene expression in higher plants has been achieved with guayule. Bioregulator-treated tissues were induced to increase the quantity and efficiency of enzymes, which in turn produced synthesis of elevated levels of latex. This successful increase of latex by application of a regulatory compound in guayule is a major accomplishment that has broad implications relative to other crops.

Absciscic acid production in plants. Absciscic acid (ABA) is a natural plant hormone that can seriously inhibit plant performance by causing such problems as premature leaf and bud drop and can affect the development of edible plant portions. Improved knowledge of ABA synthesis recently gained through ARS research will improve overall understanding of hormonal control of plant growth and development, and should pave the way for new approaches to improved crop performance and product quality.

Improved cotton fabrics. The recent trend of synthetics to displace cotton is being countered by the development of cotton with improved and/or unique qualities. For example, until recently it was impossible to produce cotton fabrics with both durable-press and flame-retardant properties. However, crosslinking agents have been found that are capable of facilitating both of these desirable qualities, thus adding to the versatility of cotton.

The smoldering flame hazard associated with cloth-covered furniture may be reduced by applying the upholstery over boric acid-treated cotton batting instead of over the foam substrate used in conventional furniture construction. Tests showed that the rate of smoldering was significantly less when treated cotton batting was the substrate. Often, ignition could not be made to occur at all in upholstery applied over treated cotton batting.

Strength-weight considerations and the heavy chemical loadings required to provide flame retardancy in cotton hinder its use in outdoor military applications. However, ARS has now developed an experimental thread made of a glass filament core wound with cotton yarns that shows an improved strength-to-weight ratio and can be made more flame resistant with less chemicals than can all-cotton fabrics. This innovation is expected to impact on the military use of outdoor cotton fabrics and to find additional application in both military and civilian markets.

Means found to reduce bitterness in citrus. Undesirable citrus juice components lower quality and reduce market desirability. Discovering the causes of unacceptable flavor development in citrus and devising the means to treat the juice to remove them would increase consumption. Recent studies have shown that the treatment of grapefruit juice with B-cyclodextrin polymer will reduce the bitter components, naringin and limonin and that other glycosides in grapefruit cause "immature" flavor and can be removed by centrifugation.

Rapid new hide processing method reduces pollution and lowers costs. More than half of U.S. cattle hides are exported for leather manufacture in other countries where labor costs are lower and environmental regulations less restrictive. To counter this trend, ARS scientists have developed a radically new approach to hide processing -- Continuous Automatic Beamhouse Processing -- that reduces pollution and automates hide handling. A delegation from the French tanning industry has visited the ARS pilot plant facilities for a demonstration of the process and discussed the possible purchase of French rights to the technology. This is the first industrial interest shown in the Automated Beamhouse and could lead to the first tanning installation of the new technology.

Innovative Methods for the Classing and Handling of Wheat. Historically, subjective evaluation of the morphological characteristics of the wheat kernel is used to establish the specific wheat class when grading. New approaches to attain desired breeding objectives through wide crosses between wheat classes have produced varieties that look like soft wheats but mill as hard wheats. This disparity between appearance and end-use properties, generally bread wheats are hard and cake wheats are soft, has created an urgent need for objective methods of wheat classing. Grade specifications also require an exact knowledge of the percent of any one class in another. A prototype grain-hardness tester developed by ARS shows promise as an objective means of determining wheat class. Computer analysis of resultant stress-strain measurements on single kernels determined to within 90 percent accuracy the composition of hard/soft wheat blends.

Another potentially important grain handling innovation is a simple and rapid electrical method for determining the rate of water penetration during the conditioning of wheat. The information would help in the determination of optimal conditioning time formally empirically based upon grain moisture content, hardness, protein content, and kernel size and shape. Commercial milling practices require that certain conditioning specifications be met to achieve optimal quality of the finished product.

How sodium nitrate helps preserve processed meat products. For the first time, the actual generation of an antioxidant factor by the addition of sodium nitrate to raw meat has been demonstrated. While the ability of sodium nitrate to delay meat fat rancidity had been previously reported, the mechanism of its action was not understood. Although the newly observed antioxidant factor has not yet been identified, it is associated with the polar (membrane) lipid fraction and is known to be stable in storage. The antioxidant activity generated by sodium nitrate is important to extending the shelf-life of cured meats and may prevent the formation of possibly toxic factors.

Steam conditioning to destroy salmonellae in poultry feed. Poultry feed is considered one source of salmonellae a bacteria which infects the live bird and contaminates processed poultry carcasses. Experiments confirm that increasing the steam flow during feed pelleting can destroy the bacteria in the feed. An experimental poultry feed steam conditioner has been designed, constructed, tested, and found to eliminate salmonellae at the conditioner stage of feed pelleting. Chick feeding studies indicated that the process does not affect the nutritional quality of conditioned pelleted feed. This experimental conditioner could prove to be a useful modification for existing pellet mills to provide a greater margin of safety for production of salmonella-free poultry feed.

CO₂ "sniffer" developed to detect contraband plant materials. The illicit importation of plants into the U.S. poses a serious risk that these materials might carry dangerous diseases or insect pests such as the Mediterranean fruit fly. A CO₂ detector has been developed by ARS scientists that electronically "sniffs" luggage for the presence of contraband fruits and vegetables. The hand-held gun activates a warning light when it detects high levels of carbon dioxide (CO₂) in luggage. Plant materials give off carbon dioxide once they have been picked. In 1983, prohibited fruit accounted for about two-thirds of the 476,000 products seized at U.S. international airports. More than 31,000 insects were sifted out of the seized materials.

Protecting textile mill workers against exposure to unwashed cotton.

Textile mill workers breathing dust from unwashed cotton may develop serious lung dysfunction. The problem may be significantly lessened by the washing of cotton prior to mill processing. However, it is impossible to visually determine whether cotton has been washed. Two detection methods (differential scanning calorimetry, and thermogravimetric analysis) have been evaluated and found to be accurate, but the former was deemed easier to use and interpret. The presence or absence of potassium in a sample of raw cotton has also been shown to be a suitable determinant of its wash status. The use of potassium-sensitive electrode analyses to determine the potassium content of cotton would be a quick, accurate, and inexpensive method of detecting unwashed cotton prior to worker exposure. Reducing worker exposure to unwashed cotton should help minimize health risks associated with cotton textile processing.

Biological control of brown rot achieved. Brown rot is the world's most pernicious post-harvest problem of stone fruit. Increasing resistance of the rot to chemical fungicides spurred efforts to develop new biological control methods. A strain of bacteria has been isolated that produces an antibiotic which provides brown rot control that is safer, more effective, and longer lasting than that achieved with chemicals. Other ARS researchers have characterized this antibiotic and found it to be active against a wide range of plant pathogens. These findings could lead to new biological control agents useful with numerous crops and stored products, and to annual savings of millions of dollars from brown rot control alone.

Pheromone for rice weevil and maize weevil synthesized. Another weapon in the pheromone arsenal is being developed by ARS scientists who have isolated, identified, purified, synthesized, and tested the aggregation-triggering pheromone produced by male rice weevils and maize weevils. The use of this attractant to summon large numbers of susceptible weevils to central sites will aid pest-monitoring operations and could be combined with other pest management practices for population suppression.

Alternatives to ethylene dibromide (EDB) developed. The use of EDB as a quarantine fumigant against insect pests was banned in September 1984, except for imported mangoes and for the export of grapefruit and papaya. Also, EDB can only be used for grapefruit export to January 31 of each year. Because of these factors, it was essential that acceptable alternatives be developed. Cooperative research is being conducted to develop acceptable treatments for fruit flies that involve the use of cold temperatures or methyl bromide for citrus as well as the "double dip" treatment for papaya. The "double dip" method is the first to be developed that encompasses a specific, sequential treatment that does not require the use of chemicals. This method combines immersion of papayas in water at 108°F for 40 minutes (for preheating); a second immersion in water at 120°F for 20 minutes; and finally the selection of papayas that are one-quarter ripe -- a condition in which the fruit contains a chemical that prevents development of fruit flies. Methyl bromide and the "double dip" method, both approved for use in the U.S. by Federal and State regulatory agencies, have excellent potential for approval as quarantine treatments, thus maintaining U.S. exports to Japan of citrus and papaya valued at more than \$120 million annually.

Potential new market for cling peaches through dehydrofreezing. Export of U.S.-grown fruits to Far East markets is hindered by rising transportation and metal can costs. Dehydrofreezing, in which about half the water is removed from a food prior to freezing, would lower packaging and shipment costs. ARS scientists, in cooperation with the California Cling Peach

Advisory Board, have overseen the commercial production of two tons of dehydrofrozen cling peaches for shipment to Japan, where they were reprocessed into several products for test marketing. Encouraging initial results led to a request for 90 additional tons for the 1985 marketing season. Though this large order could not be met, evaluation of smaller samples continues while large-scale production facilities are established. Dehydrofreezing, or a variation of it, could soon account for up to 20 percent of the total market for U.S. cling peaches.

Improving the marketability of U.S. peanuts. Foreign material (glass, rocks, etc.) in U.S.-grown edible peanuts hinders both domestic and foreign markets. The problem occurs far more often from the use of peanuts produced by U.S. mechanization than from those grown in countries still dependent on hand labor. Scientists have devised a means of improving the air separation process by which peanuts are cleaned prior to shelling. The installation of a specially designed air stratification section and louvred separation chamber would ensure that foreign material is concentrated for easy removal and not trapped with the peanuts. Application of this innovation should significantly reduce the number of complaints and lawsuits and enhance the worldwide marketability of U.S. peanuts.

Farmers' stock peanuts are typically stored in metal above-ground buildings for periods of a few weeks to 10 months. Solar radiation absorbed by the metal walls of such storage facilities causes day and night temperatures of the walls to vary more than 100°F. Peanuts in close proximity to the walls undergo similar temperature fluctuations. Such rapid and extreme temperature changes cause elevated moisture levels which lead to the development of molds and the production of aflatoxin when favorable conditions exist. However, storing peanuts at ground temperature (55-70°F) in semi-underground facilities has been shown to help retain optimal peanut quality and milling characteristics. The maintenance of more uniform temperature and relative humidity conditions throughout storage would minimize loss of peanut quality and save the industry millions of dollars annually.

RESEARCH ON HUMAN NUTRITION

Current activities: The major USDA program in human nutrition research resides within ARS. It is necessary, however, to carefully coordinate the work of several groups to assure best use of available expertise and resources, as significant nutrition research and evaluation projects also are found in CSRS, HNIS, FNS, and ES. Also, nutrition information and education projects are conducted by HNIS, FNS, ES, FSIS, and OGPA.

Research effort is being focused on defining required and safe levels of nutrients and other food components for all stages of life. Nutrient needs and tolerances may vary with age, sex, physical activity, genetic differences, and other environmental or host-related factors. Emphasis is placed on the special needs of infants, young children, and the elderly, and evaluation of nutritional status.

Selected examples of recent progress:

Adequate dietary chromium may help in prevention of diabetes and hypoglycemia. It has been shown that added chromium in the diet can lead to an improvement in glucose tolerance under certain conditions. In a recent study, exercise-induced increases in glucose utilization in male

joggers were accompanied by a significant increase in chromium mobilization and subsequent urinary excretion. Supplementation of elderly subjects for 12 weeks with 200 micrograms of chromium per day led to improved glucose metabolism. The role of chromium in glucose metabolism and its relationship to diabetes and hypoglycemia suggest that marginal dietary chromium intakes may be a factor responsible for suboptimal health.

Diet control and exercise can reduce rate of muscle protein breakdown in the elderly. It has been shown that physical work capacity, muscle mass, and rates of protein turnover are reduced with age. The rate of albumin formation is controlled at a lower set point, and muscle makes a reduced contribution to whole body protein turnover in older as compared to young adults. Whole body leucine metabolism examined while subjects were in the post-absorptive state did not reveal major differences between young and older adult subjects. However, it was found that the rate of breakdown of muscle protein is under the control of diet and of hormones. Preliminary results of a 3-month training program for elderly men and women indicate increases in functional capacity and reductions in percent body fat. These findings may have significance for the preservation of muscle mass during aging.

Zinc supplementation may be needed by pregnant women. Zinc supplementation (20 mg/day) of the diets of pregnant Hispanic women in a controlled study, resulted in increased final serum zinc levels and higher infant body weights. The incidence of pregnancy-induced hypertension also was lower among the zinc-supplemented women.

Dietary fiber intake lowers blood cholesterol. High levels of serum cholesterol are generally considered to increase the risk of developing heart disease. The intake of diets that lower blood cholesterol without producing any undesirable side effects is therefore desirable. A human study showed that a number of purified dietary fibers, when added to the normal American diet, lowered blood cholesterol in men after 4 weeks. The effective fibers all had the property of forming gels in solution. No undesirable effects of these fibers were observed, such as loss of trace elements from the body. The results indicate that the inclusion of gelling fibers in the diet may be a safe means of lowering blood cholesterol levels.

Sucrose and fructose magnify copper deficiency. When rats were fed diets deficient in copper and containing either sucrose or fructose as the dietary carbohydrate, 30-60 percent of them died after 7 weeks due to heart pathology associated with cardiovascular function. In contrast, the copper-deficient rats fed starch as the dietary carbohydrate rarely died. Other symptoms such as anemia, high serum triglyceride levels and impaired glucose tolerance were observed only in the copper-deficient rats fed the sugars. Diets consumed by Americans contain relatively high levels of sucrose and fructose and marginal amounts of copper (about one-half the amount suggested by the National Academy of Sciences). If the same type of interaction between type of dietary carbohydrate and copper status found in rats also occurs in humans, it may be possible to decrease some of the risk factors associated with heart disease by replacing sugars with starch.

Effects of self-selected diets on mineral balances (calcium, phosphorus, magnesium) of adults. The effect of three major dietary minerals (calcium, phosphorus, magnesium) consumed by adults, 21 to 52 years of age, under natural conditions of customary diets was determined by the balances of these nutrients. Mineral balances were also related to level of dietary

protein consumption. Calcium and magnesium intakes, especially for women, are generally below the RDA, while phosphorus and protein intakes higher than recommended. Fifty percent of the women and the men 35 years of age and older, but only 20 percent of the young men, were in marked negative calcium balance. Phosphorus balances of 60 percent of the adults were also grossly negative. Magnesium balances were only slightly negative for 60 percent of the adults. Dietary protein level adversely affected calcium, phosphorus, and magnesium balances of only the women 35 years of age and over. This depressive effect of the level of dietary protein on calcium balance of the women approaching menopause will ultimately affect their bone metabolism. Hormonal changes, particularly estrogen, at and after menopause will result in additional stress on calcium and bone metabolism with bone fractures occurring in those women whose bone densities are below a critical level prior to menopause.

Protein and energy intakes of exclusively breast-fed infants. Human milk intake and growth performance of exclusively breast-fed infants from middle- and upper-socioeconomic groups have been documented during the first four months of life. The absolute amount of milk ingested plateaued over the study period at 733 grams/day. The amounts of energy and protein available from this amount of milk suggests a more efficient utilization of energy and nitrogen for growth by breast-fed infants or differences between formula- and breast-fed infants in the composition of tissues gained during growth. In complementary metabolic studies, mineral utilization appeared to differ between formula- and human milk-fed infants, and significant quantities of lysozyme, lactoferrin, and secretory IgA that occur in human milk were found to survive passage through the gastrointestinal tract. The studies of immune components suggest that human milk has the ability to modulate immune responses throughout the upper and low gastrointestinal system.

INTEGRATION OF AGRICULTURAL SYSTEMS

Current activities: The data and technologies needed to solve agricultural problems typically are developed by disciplinary research on the components of a system--such as soils, plants, insects, and livestock. Farmers, ranchers, and other resource managers traditionally have had to integrate new research findings into their own operations by trial and error--a slow, costly, and high-risk process. The objective of systems research is to integrate those data and technologies into workable and proven practices for use by farmers, action agencies, and other users of research. Physical and biological data are assembled into models that can account for the interactions among the different components of the systems being managed. The accuracy and validity of these models, and the utility of new technologies such as crop varieties and tillage practices, are established in appropriate pilot tests and field experiments before transferring the results to users. Multidisciplinary teams of scientists and engineers are organized to carry out and transfer the results of systems research. The results of systems research range from simple models to help farmers determine the best methods for pest control, irrigation, tillage, seeding, and other practices to complex models for assessing environmental effects such as soil erosion on a national scale. Remote sensing technologies increasingly will be used to supply the data needed for helping to manage agricultural systems and make environmental assessments.

Selected examples of recent progress:

Model developed to help control leafspot in peanuts. Daily leafspot advisories are prepared using a weather-based simulation model. These advisories are made available to growers via TV, radio, and recorded messages accessible by telephone. In five years of testing on farms in Virginia, the number of fungicide applications was reduced to 3 per year in comparison with 7 applications using current recommendations. Peanuts sprayed according to the weather advisory have more leafspot than those sprayed more frequently, but yields and quality of the peanuts were not reduced. Potential benefits of this technology are approximately \$40 per acre for the farmers and \$3.8 million for the growers in Virginia, plus reduced risks of environmental pollution.

COFARM, a model for efficient soil and crop management. Farmers, extension specialists, and researchers can use COFARM for organizing and storing data for individual fields, soils, and crops. The model can simulate the effects of different management practices and help make decisions on fertilization, tillage, drainage, residue management, and other key activities for producing crops efficiently and controlling soil erosion. The computer program is user friendly and operates using a remote terminal or microcomputer. This model is one example of a number of management models that are becoming available for reducing production costs and conserving natural resources on the nation's crop and rangelands. Some of these models are being tested for making crop production forecasts here and in foreign countries.

Remote sensing technologies advancing on a number of fronts. A hand-held infrared thermometer assesses the effects of plant stress on crop yields and aids in scheduling irrigation. This rapid, low-cost method for surveying large areas is being used by farmers. An aircraft-mounted video camera shows great promise for identifying weeds in crop and rangelands, monitoring their spread, and delineating areas requiring control. Video systems have potential for providing affordable, real-time data for many kinds of farm management decisions. Satellite imagery is being used to monitor floods, predict runoff from rainfall and snowmelt, and assess crop conditions. A cooperative project with the Soil Conservation Service was initiated for using satellite imagery to reduce costs and manpower needed in carrying out the National Resources Inventory. A recent space shuttle flight included an experiment to measure soil water content with radar, a technique that also holds promise for practical use in managing our water resources.

Numerical model developed for pesticide usage. Many pesticides move into streams and other waters on soil particles from eroded farmland. A numerical model was developed to assess the pollution potential of pesticides that move from sediment into water. The model predicts concentrations of pesticides as a function of time that can be used to assess the rate of release of a pesticide into the water from the bottom sediments. The model can serve as a screening tool for pesticide use and as an indicator of where, within the aquatic environment, the presence of a pesticide poses the greatest threat.

AGRICULTURAL RESEARCH SERVICE

The estimates include proposed changes in the Language of this item as follows:
(deleted matter enclosed in brackets.)

Buildings and Facilities:

[For acquisition of land, construction, repair, improvement, extension, alteration, and purchase of fixed equipment or facilities of or used by the Agricultural Research Service, where not otherwise provided, \$23,050,000 to remain available until expended.]

The change proposes excluding language authorizing acquisitions of land, construction, repair, improvement, extension, alteration and purchase of fixed equipment or facilities at Fargo, North Dakota; Ames, Iowa; Aberdeen, Idaho; Mississippi State, Mississippi; Oxford, Mississippi; and Booneville, Arkansas. Language for these activities will not be required in FY 1986.

AGRICULTURAL RESEARCH SERVICE

BUILDINGS AND FACILITIES

| | |
|--------------------------------|--------------------|
| Appropriation Act, 1985..... | \$23,050,000 |
| Budget Estimate, 1986..... | - - |
| Decrease in Appropriation..... | <u>-23,050,000</u> |

SUMMARY OF INCREASES AND DECREASES
(on basis of appropriation)

| <u>Items of Change</u> | <u>1985 Estimated</u> | <u>Program Changes</u> | <u>1986 Estimated</u> |
|---|---------------------------|----------------------------|---------------------------|
| South Central Small Farms Research Center, Booneville, Arkansas..... | \$450,000 | -\$450,000 | - - |
| Germplasm Collection Facility, Aberdeen, Idaho..... | 300,000 | -300,000 | - - |
| National Soil Tilth Center, Ames, Iowa... | 11,100,000 | -11,100,000 | - - |
| Warmwater Aquaculture Research Center, Mississippi State University, Mississippi..... | 700,000 | -700,000 | - - |
| USDA Sedimentation Laboratory, Oxford, Mississippi..... | 1,400,000 | -1,400,000 | - - |
| Metabolism and Radiation Research Laboratory, Fargo, North Dakota..... | <u>9,100,000</u> | <u>-9,100,000</u> | <u>- -</u> |
| Total available..... | <u>23,050,000</u> a/ | <u>-23,050,000</u> | <u>- -</u> |

a/ Of this amount, \$20,950,00 is being proposed for rescission. This action also rescinds \$16,950,000 of unobligated balances available in FY 1985 from FY 1984 Congressional Action. This rescission is proposed to assure a more effective use of existing facilities; eliminate excessive Federal spending while reducing the budget deficit and further resist efforts to construct unnecessary new research facilities.

Project Statement

| | : 1984 : | | : 1985 (est.) : | | : 1986 (est.) : | |
|------------------|---------------|----------------------|-------------------|----------------------|-----------------|------------------------------|
| Project | : Amount | : Staff: : Years: | : Amount | : Staff: : Years: | : Decrease | : Staff: : Amount : Years |
| Construction ARS | :\$9,241,927: | - - : | :\$23,050,000 a/: | - - : | -\$23,050,000: | - - : - - |
| Unobligated | : | : | : | : | : | : |
| balance | :71,220,999: | - - : | - - : | - - : | - - : | - - : - - |
| Total available | : | : | : | : | : | : |
| or estimate | :80,462,926: | - - : | : 23,050,000 : | - - : | - 23,050,000: | - - : - - |

a/ Of this amount, \$20,950,000 is being proposed for rescission.

JUSTIFICATION OF DECREASE

- (1) An decrease of \$23,050,000 for Buildings and Facilities:

BUILDINGS AND FACILITIES

Need for Change. Funds for projects contained in the FY 1985 Continuing Resolution totaled \$23,050,000. The funds are available until fully expended and are not required in the FY 1986 Appropriation Act. Furthermore, of this amount, \$20,950,000 is being proposed for rescission.

Nature of Change. No funds are requested for Buildings and Facilities projects in FY 1986.

Agricultural Research Service
Status of Construction Projects as of January 1985

Status of research facilities authorized in prior years and reported as uncompleted in the 1985 Explanatory Notes, is as follows:

NOTE: Design criteria, provided by ARS, specifies the program requirements for the facility and forms the basis for negotiation of architect-engineer contracts. Diagrammatic drawings or concept drawings provide the basis for the first review of the architect's design. Tentative drawings or architect's design are provided by the architect for firming up cost estimates and basis for developing the completed, and final working drawings.

| <u>Location and Purpose</u> | <u>Year</u> | <u>Amount of Funds Provided</u> | <u>Description</u> |
|--|---|--|--|
| Arkansas, Booneville <u>South Central Small Farms Research Center</u> | 1985 Plans and Construction.....\$ | 450,000 f/ | This item is proposed for rescission. |
| Colorado, Fort Collins <u>Animal Disease Center</u> | 1979 Plans..... | 700,000 | Design criteria and diagrammatic drawings were completed in the second quarter of fiscal year 1981. |
| Iowa, Ames <u>National Soil Tilth Center</u> | 1984 Plans..... 1985 Construction..... Total..... | 800,000 11,100,000 f/ 11,900,000 | AE contract was awarded for design criteria and design in the fourth quarter of fiscal year 1984 and is expected to be completed in the fourth quarter of fiscal year 1985. \$11,100,000 is proposed for rescission. |
| Idaho, Aberdeen <u>Germpasm Collection Facility</u> | 1985 Plans..... | 300,000 f/ | This item is proposed for rescission. |

Status of Construction Projects as of January 1985 (Cont'd.)

| <u>Location and Purpose</u> | <u>Year</u> | <u>Amount of Funds Provided</u> | <u>Description</u> |
|---|------------------------------------|-------------------------------------|---|
| Massachusetts, Boston <u>Adult Human Nutrition</u> | 1978 Plans..... | \$ 2,000,000 | AE contract was awarded in fourth quarter of fiscal year 1978. Architect's design was completed in the fourth quarter of fiscal year 1979. Construction contract for Phase I (site work and excavation) was awarded in the first quarter of fiscal year 1980 and was completed in the fourth quarter of fiscal year 1981. Construction contract for Phase II (laboratory building) was awarded in the third quarter of fiscal year 1981 and completed in the fourth quarter of fiscal year 1982. Phase III (completion of remaining interior spaces) was awarded in the fourth quarter of fiscal year 1982 and completion is projected to be in the second quarter of fiscal year 1985. |
| | 1979 Construction..... | 21,100,000 | |
| | 1980 Redirection..... | 2,187,000 a/ | |
| | 1982 Redirection..... | 1,490,748 b/ | |
| | 1982 Construction..... | 5,896,000 | |
| | Total..... | 32,673,748 | |
| Mississippi, <u>Mississippi State</u> <u>Warmwater Aquaculture</u> Research Center | 1985 Plans..... | 700,000 | Clarification of ARS program objectives and facility needs are being explored. |
| Mississippi, Oxford <u>USDA Sedimentation</u> Laboratory | 1985 Plans and Construction.... | 1,400,000 | Design criteria and design will commence in the second quarter of fiscal year 1985 and expected to be completed in the first quarter of fiscal year 1986. Construction is projected to be awarded in the first quarter of fiscal year 1986 and completed in the first quarter of fiscal year 1987. |
| Nebraska, Lincoln <u>OTD West Regional</u> Veterinary School | 1983 Plans..... | 827,000 | Upon ARS acceptance of the grant application, design work will commence in conjunction with matching funds provided by the State of Nebraska. \$12,050,000 is proposed for rescission. |
| | 1984 Construction..... | 12,050,000 f/ | |
| | Total..... | 12,877,000 | |

Status of Construction Projects as of January 1985 (Cont'd.)

| <u>Location and Purpose</u> | <u>Year</u> | <u>Amount of Funds Provided</u> | <u>Description</u> |
|-----------------------------|------------------------|-------------------------------------|--|
| New York, Plum Island | 1973 Plans..... | \$ 250,000 | Construction of the laboratory additions was halted in |
| Additional Animal | 1976 Construction..... | 10,000,000 | March 1979 due to contractor default. The entire |
| Laboratory Facilities | 1977 Redirection..... | 294,000 c/ | project consists of completing the Vaccine Storage |
| | 1977 Redirection..... | 700,000 d/ | Warehouse, Entry and Change Facility, Animal Facility, |
| | 1978 Redirection..... | 900,000 e/ | and the Diagnostic Research Laboratory and mothballing |
| | 1981 Construction..... | 10,100,000 | the Vaccine Research Laboratory. A contract was awarded |
| | Total..... | 22,244,000 | in the second quarter of fiscal year 1980 for construction |
| | | | management services for the assessment and for the design |
| | | | and construction of the laboratory additions. The |
| | | | assessment of in-place construction and the construction of |
| | | | the Vaccine Storage Warehouse were completed in the fourth |
| | | | quarter of fiscal year 1981. Construction of the Entry and |
| | | | Change Facility and the initial phase of the Animal Facility |
| | | | was completed in the third quarter of fiscal year 1983. |
| | | | Design of the remaining phases on the Animal Facility |
| | | | and the Diagnostic Research Laboratory was awarded in the |
| | | | second quarter of fiscal year 1982. Construction of the |
| | | | Animal Facility is projected to be completed by the fourth |
| | | | quarter of fiscal year 1985. Design of the Diagnostic |
| | | | Research Laboratory (DRL) is complete. Program changes in |
| | | | cooperation with Animal and Plant Health Inspection Service |
| | | | (APHIS) has necessitated a reexamination of the DRL facility |
| | | | requirements. Contract actions are suspended pending |
| | | | reconsideration. Critical elements for the mothballing of |
| | | | the Vaccine Research Laboratory were completed. Design for |
| | | | the completion of the mothballing operations have also been |
| | | | suspended pending the considerations concerning the DRL. |

Status of Construction Projects as of January 1985 (Cont'd.)

| <u>Location and Purpose</u> | <u>Year</u> | <u>Amount of Funds Provided</u> | <u>Description</u> |
|--|------------------------------------|-------------------------------------|---|
| North Dakota, Fargo Metabolism & Radiation Laboratory | 1984 Plans..... | \$ 800,000 | Design criteria and preliminary design will commence in the third quarter of fiscal year 1985 and is projected to be completed in the second quarter of fiscal year 1986. \$9,100,000 is proposed for rescission. |
| | 1985 Construction..... | 9,100,000 f/ | |
| | Total | 9,900,000 | |
| Oklahoma, Lane South Central Agricultural Research Center | 1983 Plans..... | 350,000 | Design criteria and design for phase I was awarded in the second quarter of fiscal year 1984 and completed in the third quarter of fiscal year 1984. Construction contract for phase I was awarded in the fourth quarter of fiscal year 1984 and is projected to be completed in the third quarter of fiscal year 1985. \$1,200,000 is proposed for rescission. |
| | 1984 Plans and Construction.... | 375,000 | |
| | 1984 Plans and Construction.... | 1,200,000 f/ | |
| | Total | 1,925,000 | |
| Oregon, Corvallis National Forage Seed Production Research Center | 1983 Plans..... | 750,000 | AE contract for design was awarded in the fourth quarter of fiscal year 1984 and is expected to be completed in the third quarter of fiscal year 1985. \$3,200,000 is proposed for rescission. |
| | 1984 Construction..... | 3,200,000 f/ | |
| | Total..... | 3,950,000 | |

Status of Construction Projects as of January 1985 (Cont'd.)

| <u>Location and Purpose</u> | <u>Year</u> | <u>Amount of Funds Provided</u> | <u>Description</u> |
|-----------------------------|-------------------------|-------------------------------------|--|
| Texas, Houston | 1984 Plans..... | \$ 5,500,000 | AE contract for design criteria and design was awarded |
| Children's Nutrition | 1984 Construction..... | 49,000,000 | the fourth quarter of fiscal year 1984. The design of |
| Research Center | Total..... | 54,500,000 | the substructure is expected to be completed in the |
| | | | second quarter of fiscal year 1985 and the construction |
| | | | contract is projected to be awarded in the third quarter |
| | | | of fiscal year 1985. The design of the superstructure |
| | | | is expected to be completed in the first quarter of |
| | | | fiscal year 1986 and the construction contract is |
| | | | projected to be awarded in the second quarter of fiscal |
| | | | year 1986, and is expected to be completed in the fourth |
| | | | quarter of fiscal year 1987. |
| Texas, Lubbock | 1978 Feasibility Study. | 100,000 | AE contract for design criteria was awarded in the second |
| Plant Stress and Water | 1979 Plans..... | 800,000 | quarter of fiscal year 1980 and completed in the fourth |
| Conservation Laboratory | 1984 Plans..... | 500,000 f/ | quarter of fiscal year 1980. The design contract for the |
| | Total..... | 1,400,000 | central laboratory was awarded in the fourth quarter of |
| | | | fiscal year 1980 and was completed in the first quarter of |
| | | | fiscal year 1982. \$500,000 is proposed for rescission. |
| Virginia, Blacksburg | 1984 Construction..... | 4,500,000 | Preliminary design, including the diagrammatic or concepts |
| Virginia-Maryland | | | drawings, are completed. Design was completed in the |
| Regional College of | | | fourth quarter of fiscal year 1984. Construction was |
| Veterinary Medicine | | | awarded in the first quarter of fiscal year 1985, and |
| | | | is expected to be completed in the second quarter of |
| | | | fiscal year 1987. |

Status of Construction Projects as of January 1985 (Cont'd.)

| <u>Location and Purpose</u> | <u>Year</u> | <u>Amount of Funds Provided</u> | <u>Description</u> |
|--|--|-------------------------------------|---|
| <u>West Virginia,</u> <u>Kearneysville</u> <u>Fruit Crops Research</u> | 1973 Plans..... | \$ 200,000 | AE contract was awarded in the first quarter of fiscal year 1974, and design was completed in the fourth quarter of fiscal year 1976. Construction contract was awarded in the second quarter of fiscal year 1977 and was completed in the fourth quarter of fiscal year 1979. Additional facilities were completed in fiscal year 1983. Award of contract for the purchase and installation of the remaining scientific equipment is expected in fiscal year 1985. |
| | 1976 Construction..... | 7,570,000 | |
| | 1977 Redirection..... | -2,209,000 d/ | |
| | Total..... | 5,561,000 | |
| <u>Wisconsin, Madison</u> <u>Dairy Forage Research</u> <u>Center</u> | 1978 Plans..... | 1,000,000 | This facility is located on Baraboo field site (military base). AE contract was awarded in the fourth quarter of fiscal year 1978, and design was completed in the third quarter of fiscal year 1979. Construction contract was awarded in the fourth quarter of fiscal year 1979 and construction was completed in the fourth quarter of fiscal year 1980. Construction contract was awarded in the first quarter of fiscal year 1982 for additional support facilities and construction was completed in the fourth quarter of fiscal year 1982. Construction contract for the second residence was awarded in the fourth quarter of fiscal year 1983 and completed in the third quarter of fiscal year 1984. |
| | 1979 Construction..... | 9,000,000 | |
| | Total..... | 10,000,000 | |
| | University of Wisconsin campus site: drawing received the first quarter of fiscal year 1979. Architect's design was completed in the fourth quarter of fiscal year 1979. Construction contract was awarded in the first quarter of fiscal year 1980 and construction was completed in the third quarter of fiscal year 1981. | | |

Status of Construction Projects as of January 1985 (Cont'd.)

Footnotes:

- a/ Program funds in the amount of \$2,187,000 were reprogrammed to fund additional costs for this project.
- b/ Program funds in the amount of \$1,490,748 were reprogrammed to fund additional costs to purchase building equipment for this project.
- c/ \$194,000 was redirected from the air pollution abatement and sewage treatment project to provide funds for pollution abatement facilities in the animal and laboratory project as originally planned. An additional \$100,000 has been redirected into the animal and laboratory project from program funding.
- d/ Due to cost escalation and to provide funds to complete facilities as originally planned and designed at the Beckley, West Virginia project and the Plum Island animal and laboratory project, funds in the amount of \$2,209,000, were redirected from Kearneysville, West Virginia. \$1,509,000 was transferred to Beckley and \$700,000 to PIADC.
- e/ Program funds in the amount of \$900,000 were reprogrammed to fund additional costs for this project.
- f/ These projects in the amounts footnoted are being proposed for rescission.

AGRICULTURAL RESEARCH SERVICE

Passenger Motor Vehicles

The 1986 Budget Estimate does not include the purchase of additional passenger motor vehicles above the 472 passenger motor vehicles presently owned.

The passenger motor vehicles of this Agency are used almost exclusively by professional research investigators and technical personnel in the course of their daily work. These personnel may need to travel to individual farms, ranches, commercial firms, State agricultural experiment stations, etc, requiring a high degree of mobility. Use of common carriers are seldom feasible.

It is the policy of the ARS to pool the use of motor vehicles for different activities in order to keep the number of vehicles to a minimum and reduce maintenance cost. Monthly vehicle operation reports and periodic surveys are maintained to determine the utilization and condition of the passenger motor vehicles.

Replacement of passenger motor vehicles. It is proposed to replace 118 of 472 vehicles (including 8 buses) currently in operation. These vehicles are located at field stations and are used in connection with research studies and technical assistance. All vehicles proposed for replacement have a more than 60,000 miles or are more than 6 years of age.

Age and Mileage Data for passenger-carrying vehicles on hand as of September 30, 1984.

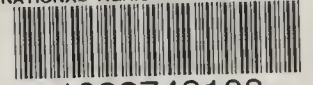
| <u>Age-Year Model</u> | <u>Number of Vehicles*</u> | <u>Percent of Total</u> | <u>Lifetime Mileage (thousands)</u> | <u>Number of Vehicles*</u> | <u>Percent of Total</u> |
|-----------------------|----------------------------|-------------------------|-------------------------------------|----------------------------|-------------------------|
| 1979-older | 212 | 45 | 80-over | 48 | 10 |
| 1980 | 68 | 14 | 60-80 | 92 | 20 |
| 1981 | 55 | 12 | 40-60 | 113 | 24 |
| 1982 | 28 | 6 | 20-40 | 110 | 23 |
| 1983 | 63 | 13 | Under 20 | <u>109</u> | <u>23</u> |
| 1984 | <u>46</u> | <u>10</u> | | | |
| Total | <u>472</u> | <u>100</u> | | <u>472</u> | <u>100</u> |

*Includes 6 vehicles used in foreign countries, and 8 buses.

Aircraft

There will not be any additional acquisitions or replacement of the seven aircraft owned by ARS in FY 1986. These aircraft are located at College Station, Texas, and Weslaco, Texas. They are used in control methods, application of agricultural materials, infrared and color photography, and evaluating efficiency affects on weather conditions.

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